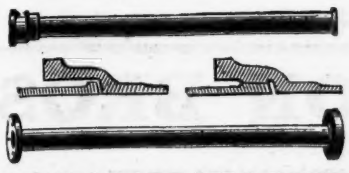
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXI. No. 1814.] LONDON, FEBRUARY 15, 1898. [50TH YEAR. PRICE 6d.

GAS AND WATER PIPES
1¼ to 12 IN. BORE.



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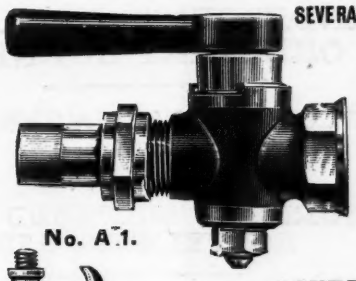

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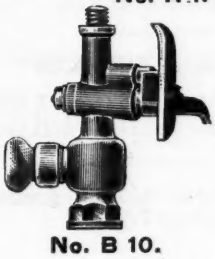

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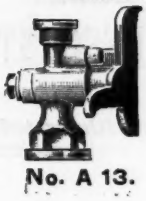
LANTERN TAPS.



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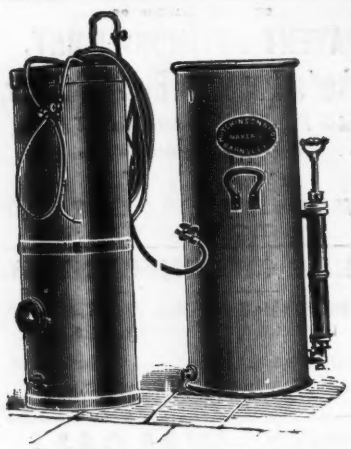

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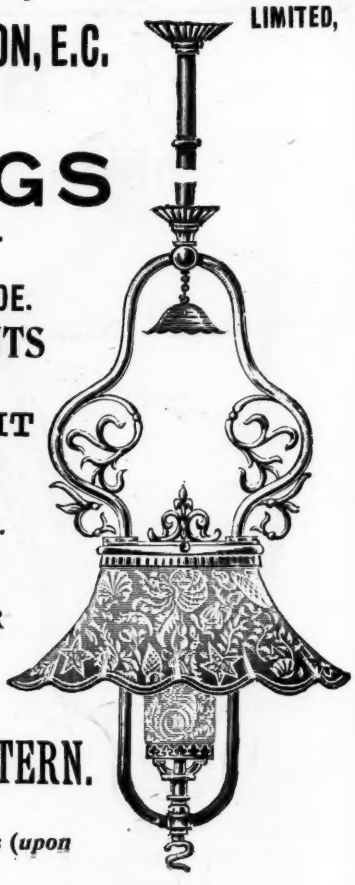

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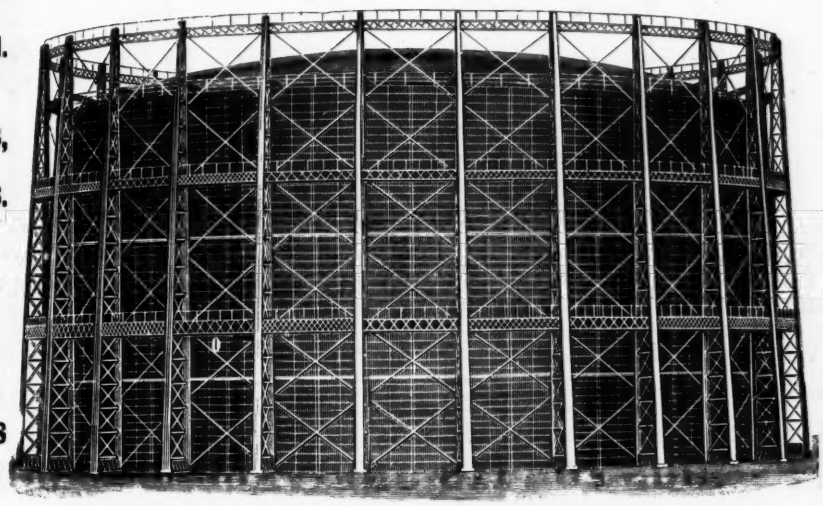

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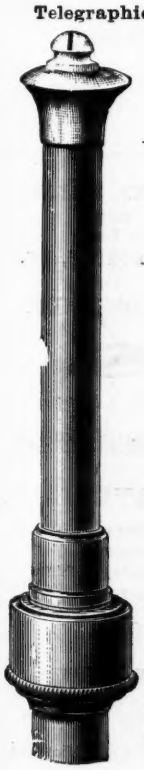

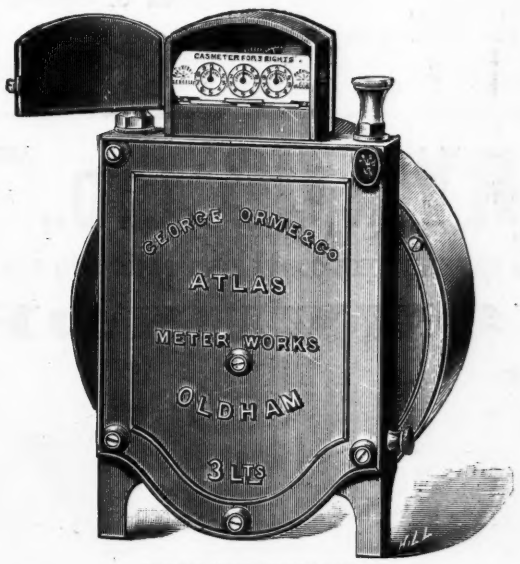

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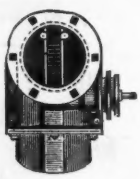

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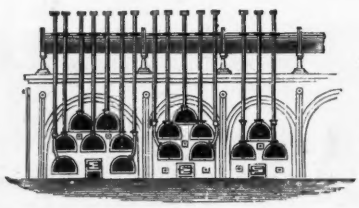

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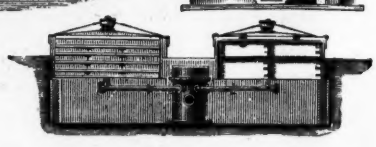

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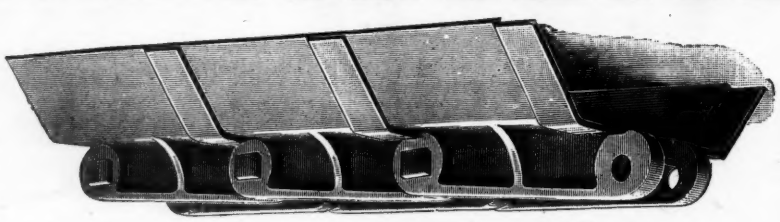

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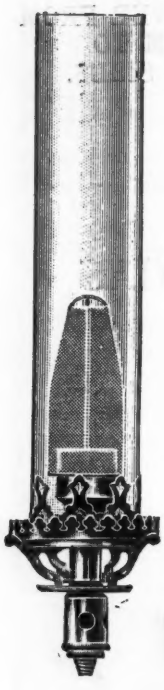

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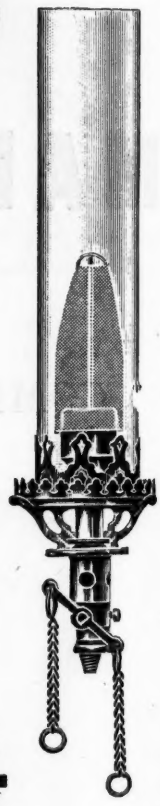

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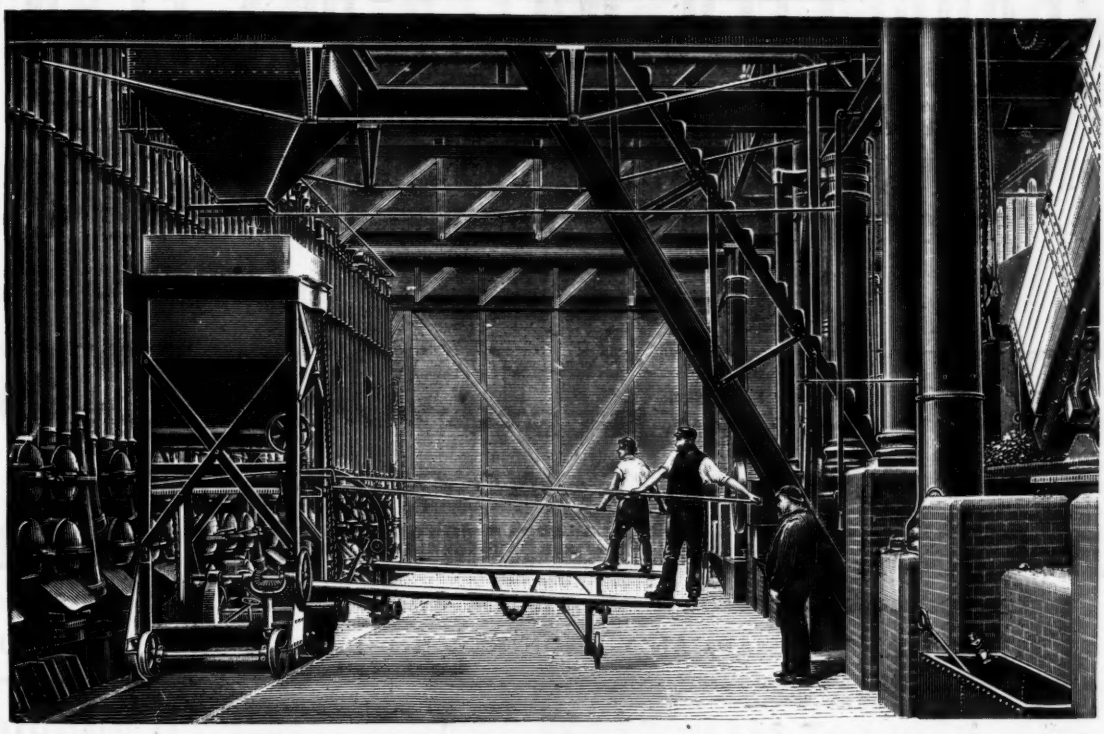

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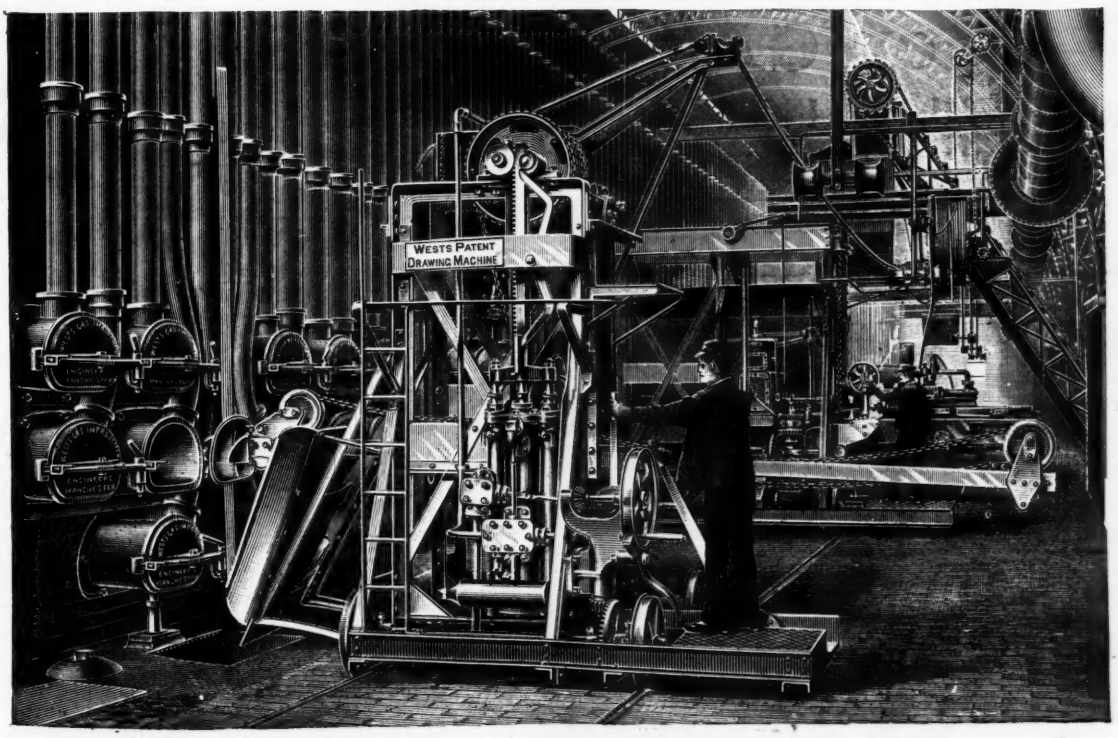

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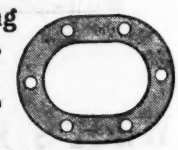

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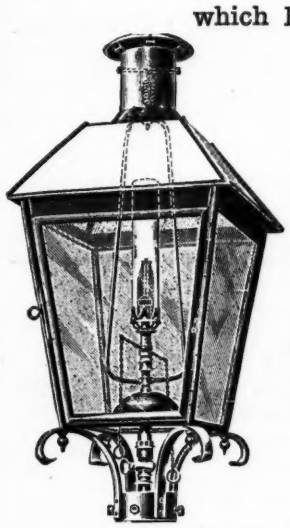

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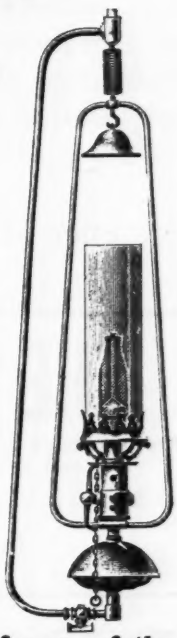

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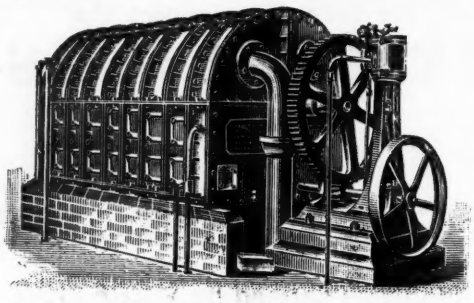
This Apparatus upholds its title, the "STANDARD;" being recognized by leading Engineers as the most efficient Apparatus for the Extraction of Ammonia from Coal or other Gases.



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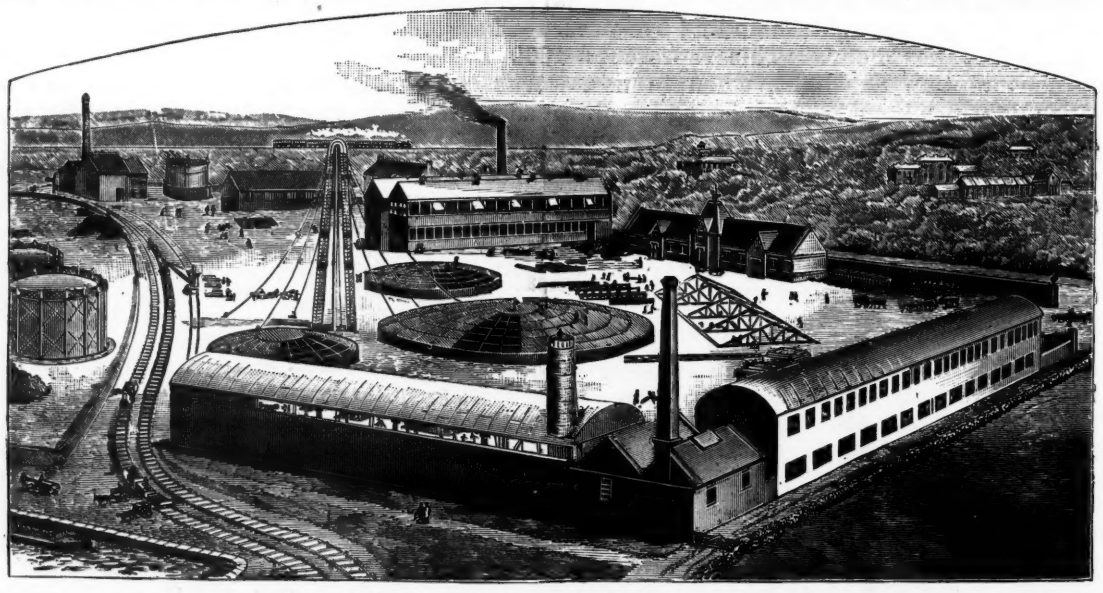

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Brussels (Second Contract)	700,000	Lea Bridge (Second Contract)	350,000
Liverpool	3,500,000	Guildford	350,000
Tottenham	750,000	Stockton-on-Tees	500,000
Tottenham (Second Contract)	750,000	Syracuse, N.Y.	850,000
Santiago	400,000	Brentford	1,200,000
Swansea	750,000	Commercial Gas Co.	850,000
Manchester	3,000,000	Commercial Gas Co. (Second Contract)	850,000
Brighton	1,750,000	Bridlington	125,000
Preston	1,500,000	Middlesbrough	1,250,000
New York	1,200,000	Croydon	1,250,000
Southport	750,000	L. & N.W. Railway, Crewe	700,000
Bath	1,000,000	Taunton	225,000
Newburgh, N.Y.	350,000	Lawrence, Mass.	400,000
Newburgh, N.Y. (Second Contract)	250,000	Rotterdam	850,000
Hoylake	125,000	Dorking	125,000
Coventry	600,000	McKeesport, Pa.	500,000
Coventry (Second Contract)	600,000	The Gaslight and Coke Co., Bromley	3,750,000
Bordentown, N.J.	125,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Winchester	200,000	Durham	200,000
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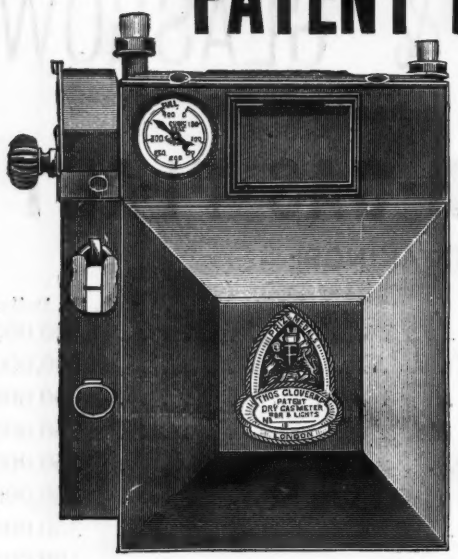

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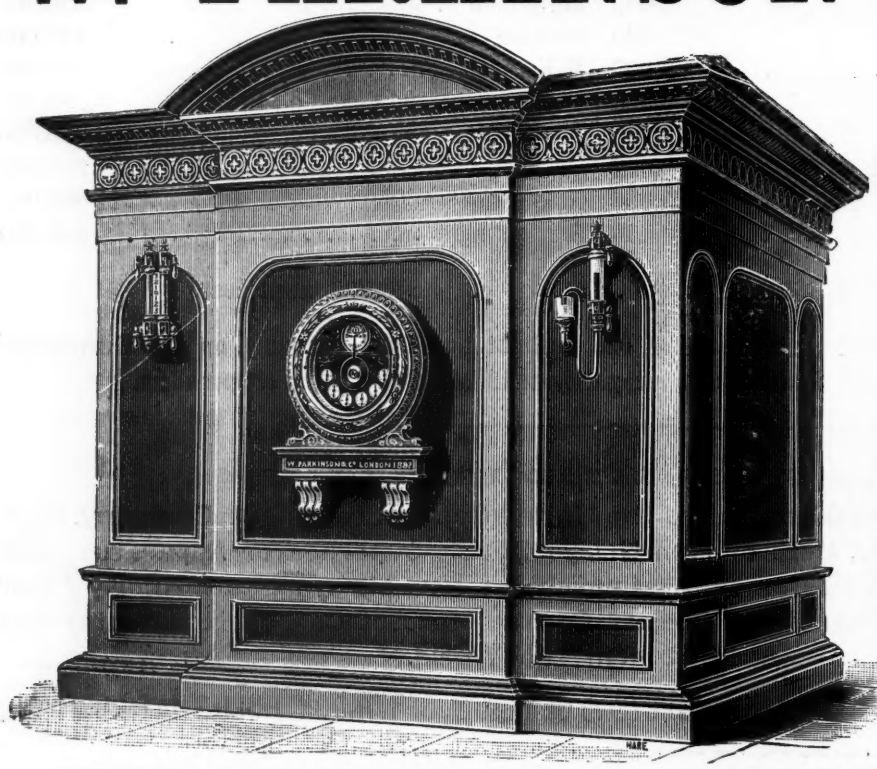

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

Agitation against The Gaslight and Coke Company.

No time has been lost by those interested in the doings of The Gaslight and Coke Company, otherwise than as shareholders, in giving warning that the recent proceedings of the Administration will bring trouble. Whatever the proprietors may or may not do with a view to putting their house in order, the local authorities and the consumers are already showing that they are not disposed either to take quietly the proposed increase in the price of gas in the northern district of the Company, or to assent to the capital consolidation scheme without some further inquiry. Notice has been given by the Parliamentary Committee of the London County Council, in accordance with the provisions of the Borough Funds Act, that the Company's Bill will be opposed "in the interest of the consumers." This is only what we have expected. Some light upon the nature of the views entertained by the Parliamentary Committee upon the Bill is afforded by a letter published in yesterday's "Times," bearing the signature of Mr. H. de la Hooke, who was Clerk to the County Council when this body opposed the first South Metropolitan Stock Consolidation Bill. The writer describes the present Bill as an attempt on the part of the Company "so to multiply or water its various classes of capital that "it may stand before the public as a Company paying a "modest dividend of 4 or 5 per cent., instead of as one "paying nearly 13 per cent." It is argued that the fact of the South Metropolitan Company having succeeded in getting a capital consolidation scheme sanctioned by Parliament ought to serve rather as a deterrent to, than as a precedent for, acceding to the similar proposal of The Gaslight and Coke Company. The letter concludes as follows: "If all the great London Gas Companies were in "succession to obtain the power of fictitiously multi-"plying their capital and in appearance reducing "their dividends, the original conditions would in time "be quite lost sight of, the public would be in ignorance "of the facts, and there would be no chance of a revision "of the conditions in the public interest at some future "time." This word "revision" is a "word of fear" to all sliding-scale companies. Mr. George Livesey has always maintained the view that the initial price under the sliding-scale was intended to be, and must in fact be, regarded as permanent, inasmuch as it was the consideration upon which the old maximum price for securing the statutory 10 per cent. dividend was given up. This view, however, has never been formally accepted by Parliamentary Committees; and the London County Council and their predecessors, the Metropolitan Board of Works, have never agreed to it. The increase in price threatened by The Gaslight and Coke Company, as we remarked last week, is calculated to bring the question into judgment; and the counts of the indictment are already being framed. The Vestries on the north side of the Thames are stirring in the matter; and a revival of "gas agitation" in and out of Parliament is impending. All this cannot fail to be detrimental to the repute, if not to the interest, of Gas Companies in general.

The Meeting of the Southern District Association.

THE annual meeting of the Southern District Association of Gas Engineers was held last Thursday, when the President, Mr. R. Beynon, of Torquay, delivered the practical and unpretentious address which we reproduce in another column. The attendance at the meeting was poor, and at the dinner which followed even worse; which display of indifference was a disappointment to all those members who did attend. We offered some criticism in this regard in our notice of the autumn meeting of the Association, when the trouble was of a different character. Then the room was overcrowded, and it was felt by many members that the place of meeting—the Holborn Restaurant—was not the most desirable that could be imagined as the scene of a technical assembly. When it comes to be a question of holding a short sitting, to be followed by a fraternal dinner, the same objection to the place of meeting does not apply. To meet in one of the rooms of the Holborn Restaurant and be able to step into an adjoining apartment for dinner is at least a convenient and time-saving arrangement, whatever else may be remarked about it. It is not enough to say that the loss on the last occasion was theirs who stayed away. The members generally, besides

the Past-Presidents and the members of the Committee, ought to feel the bond of loyalty to their President and the Association more than appears to be the case. It is not to be gainsaid that the season is a somewhat inconvenient one for gas managers to be leaving home for a night; and this, unfortunately, is what the holding of an evening meeting in London means to a considerable number of the members of the Southern Association. We have always been of opinion that the possibility of attending a meeting and getting home again the same night should be one of the distinguishing facilities offered by district technical societies. But circumstances alter cases; and the circumstances of the Southern District Association as at present constituted are exceptional. The state of affairs revealed on Thursday deserves the earnest attention of the Committee and the members of the Association in general. The occasion may have been exceptional; and it is to be hoped that this is the interpretation. The sickly season doubtless had some little effect upon the attendance; and another deterrent influence was probably the uneasy feeling that the missing winter may even yet pounce upon us at any moment. Still, after making all allowances, the fact remains that Thursday's gathering was not creditable for numbers to one of the largest and most popular of the District Gas Managers' Societies in the kingdom.

The Opening of the Parliamentary Session.

Parliament was opened last Tuesday, with a Queen's Speech of very modest pretensions. At a first glance, the Ministerial programme of legislation and administrative reforms does not offer any point of particular interest to followers of the gas industry, with the single exception of the proposed change in Scottish Private Bill procedure, which may give a slight pang to Westminster. More general interest attaches to the promise of a measure "for "guarding against fraud in the management of limited "companies." Upon closer inspection, however, the gas industry, or rather that development of it which can be summed up in the one word "sulphate," may be supposed to look with some little interest on the mention in the Queen's Speech of the bounty-fed sugar question. There is not much doubt in any mind that has, in however slight a degree, been directed to the subject, that cheap beet sugar has wrought havoc with the sugar-cane cultivation. And beet sugar has been fed as much by British-made sulphate of ammonia as by Government bounties. It is to be hoped that when the subject of West Indian relief comes up for discussion in Parliament, somebody will take care to raise the question as to whether the West Indian planters have practised the science of cultivation by the aid of artificial manures as thoroughly as their beetroot-growing rivals of Northern Europe. Perhaps the Sulphate Manufacturers' Association will look to it. As usual, a good deal of the interest of the Queen's Speech consisted in what it left out. Thus, the omission of all mention of the imperfect state of the law in regard to Trade Unions was a disappointment to many. But if the Queen's Speech left many matters open, the indefatigable private member hastened to fill up the measure of parliamentary capacity for dealing with controversial projects. Bills were brought in for the abolition of the defence of common employment in cases of injuries to workmen arising in occupations not within the Workmen's Compensation Act; for limiting the working time in mines to eight hours per day from bank to bank; for amending the Coal Mines Regulation Acts; for providing pensions in old age to the provident poor; for enabling workmen to acquire their own dwellings; for certificating persons in charge of steam-engines and boilers; for the registration and inspection of boilers; for enabling leaseholders to become freeholders; and so forth and so on. There are more to come; but though many Bills be brought in, few Acts result therefrom.

Clerk on the Gas-Engine and Gas-Producers.

Last month we noticed one of the articles on the large gas-engine which Mr. Dugald Clerk has contributed to the "Engineering Magazine" for January and February. The first of these articles reviewed the earlier experiments in the design of the gas-engine, and traced the development of types up to the largest units of the present day. The second essay considers the leading difficulties in the problems which now present themselves, and the prospect of their early solution. Mr. Clerk shows that these difficulties belong to two categories. The first comprises the troubles that arise in connection with any increase in size of the gas-engine itself, and the second refers to the gas-producer. The gas-engine cannot be magnified almost indefinitely, like the steam-engine, simply by having regard to the proportionate demands upon the strength of its parts. In an internal-combustion motor, the initial working temperature will be as high as 1800° C.; while the complete revolution is accomplished in one-third of a second. The forward stroke, after explosion, lasts but one-sixth of a second; and the return stroke discharging the exhaust, lasts another sixth. The wonder is that even small gas-engines do what is required of their cylinders in the time; but as the content of the cylinder is enlarged, the operation becomes increasingly difficult of accomplishment. Safety has been sought by raising the compression of the charge before its ignition, and the expedient of "scavenging" by means of a cold-air charge. These remedies only afford a certain measure of relief; and difficulty shifted from one part of the operation reappears elsewhere. Mr. Clerk states succinctly and convincingly the sources of trouble in large gas-engines, so that his readers are able to understand how it is that the growth of the gas-engine, in respect of the size of the unit of power, has been arrested. The phenomenon after all is only an analogue of the course of evolution in the natural world. Every perfected organism is limited in respect of size by various influences, some of which we can appreciate while others escape us. It is a negative good, at any rate, that we are able to perceive the limiting influences that operate in restraining the magnification of the gas-engine, and so avoid struggling against the inevitable.

With regard to the gas-producer, gas engineers entertain mingled feelings. So far as the gas industry proper is concerned, the development of gas-engines ceases to be of immediate interest long before their own limit of size is attained. Coal gas is hardly used anywhere for the generation of force in units larger than 50-horse power. Here and even below this begins the application of the gas-producer, which, to put the case as mildly as possible, does not tend to diminish the troubles of the gas-engine builder and user. The Dowson gas-producer has hitherto been the only apparatus of the kind practically in the market; and for its proper operation anthracite coal had to be purchased at a price often double that at which engine slack could be procured. Mr. Clerk remarks that these producers now use coke as well as anthracite; "but "there are many difficulties with coke which do not yet "appear to have been thoroughly threshed out." This is all he has to say on the subject; which is disappointing. What are the difficulties? They must be serious; for Mr. Clerk is driven to the conclusion that "until a cheap "and easily-operated producer is manufactured, using "common engine slack, and producing gas having (say) "80 per cent. of the heating value of the coal used, in a form "suitable for a gas-engine, it cannot be hoped that very "rapid advance will be made." Here is a chance for pyrologists. But we are not afraid that too many will "speak at once;" for Mr. Clerk's request is, after all, only the old demand for a cheap and strong artificial fuel gas, which it has seemed impossible to gratify.

The Echoes of the Late Strike.

The echoes of the fall of the Amalgamated Society of Engineers still reverberate through the Press, although public interest in the late strike has almost died out. It will be long before the last word is said upon the topic; but it is to be hoped that, as the history grows ancient, the facts may not be degraded into myths. As a means of preventing this evil result—which we may be sure the discredited Trade Union wire-pullers will do their best to bring about—the temperate words of Colonel Dyer, the Chairman of the Employers' Federation, are well worthy of being placed upon record. Speaking at the United Club recently, in a discussion upon the relations of Capital and Labour, Colonel Dyer stated that the late trouble became acute five or six years ago, when the engineering trade of the north-east coast was worried, by attacks of the A.S.E. and the allied Trade Unions, into starting the Employers' Federation. The employers were required to relinquish the control of their own works, which would have meant the stifling of invention and the arrest of progress. The employers federated in their own defence; and then the A.S.E. preferred the demand for shortened hours, which the federated employers resisted. Thereupon the A.S.E. once

more shifted their ground, and declared that the object of the Federation was solely to "smash the Union." This, as Colonel Dyer remarked, was a splendid "cry" for a section of the Press to take up; and everybody knows how eagerly it was shouted forth. Of course, it was not true; but this consideration did not count for a season. Truth is almost the last quality desired by "popular" politicians for their inspiration. Something that will make a noise—that is the great desideratum for a "popular" policy. So the platform spouters spout, and the newspaper men scribble, until the end comes, and they all topple into the ditch together. Then the politicians hunt up a fresh cry, the newspapers look out sharply for a new "sensation;" and the professional friends of the deluded British workman scheme another "organization" to keep themselves in notoriety and cash.

Meanwhile, where is the workman himself? Stripped of savings, thrown out of his regular occupation, he finds himself suing for employment at the good-will of those whom his paid advisers have taught him to hate and defraud by the abstract name of "Capital." It is another matter altogether when this abstraction takes the concrete shape of an unsympathetic foreman, who, "sizing up" the frequenter of the "Skulkers' Arms," tells him to go for work to those who have supplied him with what he is pleased to call his ideas. Old-fashioned Political Economy on the one hand and German Socialism on the other have much to answer for in regard to mystifying the people as to the source whence all wages come. Colonel Dyer says bluntly that wages come from profits; and this is near enough to the whole truth for all practical purposes. If an employer does not make profits, he will not continue to pay wages. Not all the Acts of Parliament or Government Departments in the world will suffice to make him do so in the circumstances indicated. This is apparently a simple truth; but it is nevertheless too big a one for our Socialistic Trade Unionists to grasp. The unprofitable workman must go; and in his heart he is quite aware of the fact. Of late years he has come to regard his Union as an agency under whose protection he could make sure of getting a full day's pay for half-a-day's work. This is the pernicious notion that the result of the late strike must be used to eradicate, and not merely from the followers of the engineering trade.

Sir John Lubbock and Municipal Progressivism.

The letter of Sir John Lubbock on the future of Metropolitan Government, mentioned in these columns last week, has evoked several more or less pertinent responses. Lord Welby, the Chairman of the Finance Committee of the London County Council, has disputed Sir John Lubbock's conclusions. He takes exception to the main contention of the letter that the Finance Committee should have power to pronounce upon the policy of any subject of expenditure for which it is required to find the means. Unhappily, Lord Welby does not offer any remarks upon the questions in which policy and finance are equally involved—such as the municipalization of gas supply and similar matters—which Sir John Lubbock has brought forward. This silence enables Sir John to retort that his critics ignore the whole gist of his complaint, which is that the Progressive party have abandoned "what used to "be almost an axiom amongst Liberals—that Governments and Municipalities should govern and not trade; "that private enterprise should be encouraged; and that "trade and manufactures should only be undertaken by "Governments and Municipalities under most exceptional "circumstances." In support of his argument, Sir John Lubbock quotes Mill, Cobden, and Fawcett; contending that "it is really those who advocate municipal trading "who depart from the old and wise principles of the "Liberal party, of Bright and Cobden, of Mill and "Fawcett, and have adopted the visionary schemes of "foreign Socialists. We see now," he says, "unfortunately, a craving for the municipalization of every large "industry. The question no longer is what should be "done by Governments or Municipalities, but why should "anything be left to private enterprise."

Mr. R. M. Beachcroft and others have not been backward in pointing out that Sir John Lubbock's opponents have carefully avoided the real issue raised by him, and defined by us last week. Mr. W. E. Ball endeavours to account for the remarkable influence of socialistic views upon the London County Council, which he explains by reference to the Fabian tactics introduced at the instigation of Mr. Bernard Shaw, who is credited with having made the notable discovery that Socialists might capture many seats on municipal bodies if they would only hide the name, and raise the cry of "No Politics." This, by the way, is the game that is actually being played again at the present moment in the most densely populated parts of London. The perfervid Social Democrat and Socialistic Trade Unionist takes off his scarf and puts his badges in his pocket while he professes to be interested only in such causes as the better housing of the working classes, the supply of pure water, and so forth. Why, he asks, with an innocent air, mix up party politics with these matters? Are they not desiderata upon which men of all parties are agreed? Cannot we all trust our John Burns, our Will Thorne, our Sidney Webb, to see to these things, without inquiring too closely of what colour are their political opinions? So the middle-class voter thinks it does not matter to him who gets into the County Council, until the election is over, and the "platform" of the majority is found to be of a distinctly socialistic formation. So it was in 1889, when London woke up to learn with amazement what manner of men were some of those who had wriggled into its first County Council, and were legally entitled to rank as representatives in local government of the greatest city of the world. If 1898 repeats the folly of 1889, it will be the fault of the middle-class householder.

WATER AND SANITARY AFFAIRS.

The evidence given by Mr. H. E. Haward before the Royal Commission last week was almost wholly directed to a consideration of the economy that would be effected if through a scheme of purchase the Metropolitan Water Companies were to be superseded by the London County Council. In the course of his statements, Mr. Haward made certain admissions which, like the personal evidence of Sir A. Binnie on which we lately commented, points to the appropriation of the whole area of "Water London." Mr. Haward calculated that an annual saving of £58,000 might be effected by getting rid of eight Boards of Directors, and by consolidating the entire management of the Metropolitan Water Supply in the hands of one authority. The question arose as to how far this measure of economy would be effected if the County Council, after purchasing the undertakings of the eight Companies, "had to split "up the whole concern among the six counties." Mr. Haward expressed his opinion that "the bulk of the saving "would still remain." It will be observed that Mr. Haward did not venture to assert that "all" the saving would still come to pass. This witness, therefore, who is the Comptroller of the Finance Department of the London County Council, had apparently been calculating upon a scheme in which there would be no "splitting up" of the concern among the outlying authorities. Obviously, if there is to be economy, there must be concentration. Mr. Haward said if the Council purchased the undertakings there would cease to be eight Secretaries, and so much would be saved in respect of their salaries. But if the outer areas are to stand by themselves, there will be at least half-a-dozen secretaries, whose salaries will operate to reduce the saving which figures in Mr. Haward's estimate. Are we to suppose that the Council are inclining to the idea that it will be the better plan to take in the whole parliamentary area of the Water Companies? It is asserted with tolerable clearness that this must be the first step; and perhaps it is thought that anything more may be indefinitely postponed. The Council must first obtain the entire concern, and afterwards will come the "splitting up." But if this ultimate process is to be discarded, what becomes of the much-vaunted agreements with the outer areas? Sir A. Binnie's idea is that of a Water Board, on which the Council shall have eight-tenths of the membership. The Comptroller's confession is that the economy for which he has estimated can only be fully effected by eschewing the "splitting-up" sequel.

After all, this is common sense. To sever the supply at the boundary line of the Administrative County is an engineering heresy. Nature forbids it, and scientific considerations as well as those of a financial character condemn it. But if there is to be one water authority for the whole collective area of 500 square miles, where is such a

power to be found? The London County Council cannot hope to occupy such a position; and the outer areas would not submit to it. The only chance of ousting the Companies consists in a scheme in which the several authorities interested would be duly represented. The latter would be conciliated by the prospect of having a voice in the management, which they have not now; and the County Council would have its ambition gratified by enjoying a position of pre-eminence. But the Royal Commission are sitting, and it may be some time before we know what is their judgment in the matter. If there is to be any change at all, a representative Water Board for the whole area of the supply seems to commend itself as the most reasonable arrangement. But whether the public would gain anything by it is exceedingly doubtful. Mr. Haward goes deep into finance; but he cannot tell, in the event of arbitration, what the purchase price would be, excepting that he agrees on a Stock Exchange value at the present time of 39 millions, and admits that at 33¼ years' purchase the price would be 43 millions. He correctly observed that "the Companies seemed in no hurry to part with their "property," and were pretty well content to meet what he considered were the heavy liabilities of the future. How far the County Council are looking ahead may be judged by the report of their Parliamentary Committee which comes up for consideration at the meeting of the Council to-day, containing a recommendation that the Southwark and Vauxhall Company's Bill should be opposed, unless the promoters consent that their power to draw a certain quantity from the Thames shall be limited to a period of a year. Yet the Company do not propose to draw any more water than is absolutely necessary to meet the demand. Neither are they likely to go beyond this mark.

The report by Dr. F. St. George Mivart, one of the Medical Inspectors of the Local Government Board, of which we give an abstract in another column, respecting the outbreak of typhoid fever at King's Lynn, shows how a polluted water supply, virulent in its poisonous properties, may exist even under the ægis of a public authority. It may be safely averred that if the water supply of King's Lynn had been the property of a Company instead of being held by a Town Council, anything so vile and fatal would never have been tolerated. The water at King's Lynn was the subject of complaint as far back as 1876, and was condemned by the Local Government Board in 1892. It was not so at Maidstone, where a Company had possession, and where the Local Authority, in a parsimonious spirit, restricted the precautionary use of analysis. The Maidstone water, fatal as some of it seems to have proved, was not wholly bad; and no such warning was given as in the case of the Norfolk borough. The example of the latter serves to prove how an authority elected by the popular vote may fail in the performance of a public duty in order to avoid an increase in the rates. The ratepayers of King's Lynn were determined to drink dirty water rather than go to the expense of getting that which would be clean. So they persisted in poisoning themselves, until disease and death told such a terrible tale that the very extremity of the mischief brought about a remedy. When things get to the worst they will mend; and King's Lynn is shortly to have a pure supply from wells sunk in the chalk. Had there been a Company instead of a Town Council, this must have come to pass long ago. The spectacle is a marvellous one—"a large "and influential section" of the inhabitants insisting that the water supply of their town was of excellent quality, when it was manifestly filthy and unwholesome. Not only so, but it appears that for a long time these infatuated people resisted with inconceivable bitterness the attempts made by the more intelligent of their fellow-townsmen to get a supply of water fit to drink. The end has come at last; and a Provisional Order terminates the miserable state of things which has so long imperilled life and disgraced an English town.

Cutler's Carburetted Water-Gas Plant at Plymouth.—With reference to the report which appeared in last week's "JOURNAL," giving particulars of the carburetted water-gas installation at Plymouth, it should be stated that the Company adopted this system on the advice of Mr. Samuel Cutler, who was solely responsible for the designs and specifications of the plant, which was erected by the firm of Messrs. Samuel Cutler and Sons, of Millwall. We learn that the Directors are so well satisfied with the working of the plant that they have ordered it to be duplicated.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 339.)

ALTHOUGH attention last week was largely directed to the Stock Exchange settlement, yet a fair amount of fresh business was recorded, and prices for the most part were higher. There was a much better tone during the latter days, as the political outlook was considered to have improved in regard to the Far East, as well as in the relations between Spain and the United States. The most activity was again in the American Railway Department; while English Railway stocks have improved, as the resumption of work by the engineers is expected to improve traffic returns. Foreign stocks also show an advance; the market being supported by the firmness of all the Continental bourses. As regards the better class of investment securities, the collapse of the Chinese loan negotiations brought about a recovery in Consols; but the rise was also assisted by purchases on behalf of the Government in connection with the sinking fund. Several Gas stocks have been actively dealt in, especially Gaslight "A," which is now quoted *ex div.*, as well as most of the secured issues. This accounts for the decline in the quotations as compared with a week ago; for taking the dividends into account, there is really a partial recovery. The South Metropolitan report caused a rise of 1 per cent. in the stock, as, notwithstanding the low price of residual products, the earnings have been sufficient to pay the usual dividend. The Provincial and Suburban section has been quite featureless. A little business was done in Brentford preference; but there was no change in values. A fair amount of business has been transacted in Continental Companies—Imperial Continental being 1 per cent. up on the week, to 220–225; but Continental Union fell 1 per cent., to 249–254. Water stocks have been firm—Lambeth 7½ per cent. maximum rising 3, to 230–235; and Vauxhall 7½ per cent., 2, to 162–167. The Kent stocks are quoted *ex div.*

The daily operations were: On Monday, Gas stocks were very quiet—the most dealings being in Gaslight "A," which was again flat at a fall of 2; business being recorded at 304. Dealings also took place in South Metropolitan, at 146½; Commercial, at 342½; and in Continental and Imperial Continental, the latter advancing 1. Water stocks were quite featureless. Tuesday's dealings were less numerous, owing to the settlement; but Gaslight "A" changed hands down to 303. Business was done in Imperial Continental at 224. Water stocks were idle. Wednesday was more active, both in Gas and Water stocks. Gaslight "A" again exhibited the most activity, between 305¼ to 310, the closing quotation showing a rise of 2; the "J," 1 to 320–325; and Imperial Continental, 2 to 222–227. South Metropolitan was marked 147¾. A little more was doing in Water stocks; business being recorded in East London, Grand Junction debentures, Lambeth maximum 10 per cent., and West Middlesex. The only feature on Thursday was the large dealings in Gaslight "A," between 300 and 304 *ex div.*; while the "J" marked 317, and the "K" 186. South Metropolitan was dealt in at 148. Water stocks were also inactive. Friday was a very quiet day; the most business being again in Gaslight stocks—the 10 per cent. "C," "D," and "E" rising 2, to 317–322; the "J" 1, to 316–321. South Metropolitan moved up 1, to 146–149; but Imperial Continental fell 2, to 220–225, and Continental Union 1, to 249–254. Business on Saturday was very restricted; and values were unaltered. Gaslight "A" marked 301 and 303½; while business was done in Continental Union at 250, and Imperial Continental at 225 and 221.

ELECTRIC LIGHTING MEMORANDA.

The Affairs of the St. James's and Pall Mall Company—The Leasehold Character of Electric Lighting Investments—Shop Lighting by Electricity in London—The Possibilities of Electric Cooking and Heating.

THE ordinary general meeting of the St. James's and Pall Mall Electric Light Company has been held; and the 14½ per cent. dividend already commented upon in these columns was duly declared. The speech of the Chairman of the Company, in moving the adoption of the report and accounts for the past year, contained some interesting observations. In order to encourage increased consumption of current in the district, which is full of large clubs and houses of business, the Board have decided upon yet another variation in the scale of charges for electricity. From the beginning of the year, the Company will charge 6d. per unit for the first £100 of the annual bill, and 4d. per unit for the rest; while all electricity for motive power is to be charged at 3d. per unit. The high dividend is justly regarded as likely to excite a certain amount of criticism from the local authorities and individual consumers; and in reply to this, the Chairman points out that the average price of 5d. per unit, which the Company will receive during the current year, is a fair and reasonable one. It is considerably lower than the statutory price, and is also below the charges made by most other Metropolitan electric lighting undertakings. The capital of the Company is exceedingly small for the output compared with that of other companies, "and the Directors hold that the shareholders are entitled to a fair return as the result of careful expenditure and good management." Unwittingly this Chairman is treading in the same paths as those

worn before his time by gas administrators, who have had to sustain the same burden—that the concern of the public is not with the rate of dividend but with the price of the supply. The sliding-scale principle in gas legislation was introduced to fix the connection between dividend and selling price; but it did no more than render compulsory an adjustment that the common sense of most suppliers of gas and electricity would have suggested as a matter of commercial expediency.

The St. James's Chairman had to remind his proprietary that the Company's lease of independent statutory existence has now only 33 years to run. "The investment, therefore, is rather like a leasehold investment, in which you would not only expect a fair return for your money, but would also expect to be able to put by such a sum as at the end of 33 years would leave you where you stood before you made the investment." It is uncertain what will happen to the Company at the end of their 33 years; but it is pretty sure that no "goodwill" will remain as an asset at the expiration of this period. There will be merely the value of the buildings, plant, machinery, and land; and these will be appraised not with regard to what they have done, but in respect of what they are competent to do at the time and in the immediate future. Hence for the remainder of their existence the Company will have to provide for a capital redemption fund; and 14½ per cent. dividends will be impossible. One can understand the temptation that must have beset the St. James's Board to recommend this big dividend, if only for once, just to show what they were able to do. At the same time, this policy of paying a dividend far and away above anything that the public would concede to be fair and reasonable cannot safely be persisted in. Not only must capital redemption be provided for, but the Directors will have to seriously consider whether, not in 33, but in 10 or 12 years' time, the generation of electricity in local factories in such a district will be expedient. Of course, they think of all these things; and are well paid for doing so. Meanwhile, the high dividend will facilitate the future issues of capital, which was probably its chief object.

Wayfarers in the West-end of London this season can hardly fail to be impressed by the spectacle of the almost universal use of electric lamps, of sorts, by the shopkeepers in the principal streets, to the exclusion of gas. Especially is this change to be noticed in the matter of the outside lighting of the shop-windows of drapers and jewellers; the heavy-looking gas reflector lanterns having almost wholly disappeared in favour of light electric lamp brackets carrying opal reflectors upon which the name of the firm appears. It would be absurd to deny that this change is an improvement. The old huge black japanned tin shop-window reflector light, even when it had a bull's eye let into the back, was always an eyesore. Another feature of the West-end street lighting is the re-introduction of electric arc lamps, after a long interregnum of unpopularity. These new arc lamps are small, and are of the enclosed, long-burning type adapted for connecting direct on 100-volt circuits. Their only efficient rivals appear to be the clustered incandescent gas-lamps. There has, in short, been a marked recrudescence of late in private arc lighting; and this appears to be a matter that gas-distributing engineers would do well to look into afresh.

In the last two numbers of the "Electrical Review" there has been published an abstract of a paper by Mr. W. P. Adams, dealing with the possibilities and prospects of electrical cooking and heating. The author begins by admitting that the professional mind is ordinarily sceptical in this regard; and he sets himself to show that, though electrical cooking at any rate "undoubtedly deserves to rank as a luxury, it will be well within the means of those with average incomes when the cost of current is somewhat modified." Unfortunately, Mr. Adams is fain to confess at the outset that the necessary apparatus is of "rather high cost." This is partly because electric cooking appliances are so intensely individualistic. The oven is a thing apart, and so is the breakfast cooker, so are the grillers, frying-pans, and saucepans. All must be separately wound, and all must be connected separately to the source of current. Altogether, the cooking utensils necessary for a small middle-class household would need to be competent to utilize in this way 7200 watts; while the complete lighting of the house would account for no more than 2500 watts. Mr. Adams does not say what the cost of the kitchen "battery" would be; but it is safe to guess that it would not leave much change out of a £50 note. And then there is the current. Mr. Adams has had the run of a kitchen where gas or electricity could be used at will for cooking. For five persons, the consumption of electricity was approximately 30 units per week; and when gas was used exclusively, the weekly consumption was 1240 cubic feet. The house was evidently a capital customer for the local Gas Company; for it is not every establishment of five persons that cooks with gas on such a liberal scale. But even so there is a long distance between the cost of the gas and that of the electricity, whatever ruling prices are taken for the respective agencies. No wonder Mr. Adams sighs for electricity at 1d. per unit as "the ideal to be aimed at for heating and power purposes." When this figure becomes general, we shall see what we shall see; but until this happens, the electric cooker must remain a toy. Mr. Adams feels this; and his paper concludes with an apology for making the topic the subject of a technical communication. Still, he is deserving of thanks for placing upon record the facts of a question that occasionally crops up and forms the basis of some rubbishy talk.

THE HEAT OF REVIVIFICATION OF OXIDE.

An attempt has been made by Mr. Herman Poole, in an article prepared for the "American Gas Light Journal," to estimate from thermo-chemical data the heat generated by the revivification of fouled oxide of iron. The estimation of the heat set free during revivification should be of considerable value for the elucidation of cases in which oxide has become kindled. We propose to follow Mr. Poole's initiative; but for the sake of simplifying the investigation, we shall assume that the oxide has been fouled under ordinary conditions, and that many cases for which equations can be written, but which seldom (if ever) occur in practice, need not be considered.

Irish bog oxide usually contains about 35 per cent. of monohydrated ferric oxide (Fe_2O_3, H_2O), 55 per cent. of moisture, and 10 per cent. of fibre and impurities. By air-drying, the gas manager prefers, when possible, to reduce the percentage of moisture to about 20; and the composition of the bog oxide will then be about 62 per cent. of the monohydrated ferric oxide, 20 per cent. of moisture, and 18 per cent. of fibre and impurities. Before the oxide is put into the vessels, a quantity of sawdust and wood chips is mixed with it, for the purpose of increasing the porosity of the mass. Roughly the composition of the oxide, ready for the purifiers, will be about as follows: Monohydrated ferric oxide, 56 per cent.; moisture, 18 per cent.; fibre and impurities, 16 per cent.; wood chips, 10 per cent. The proportions are here stated by weight. Naturally the proportions of wood and fibre by volume would be considerably higher; but the reactions are determined by the mass, and not the volume of active material. According to Mr. Lewis T. Wright, from 17 to 30 per cent. of the sulphuretted hydrogen taken up by oxide is absorbed according to the equation—

$$(1) \qquad Fe_2O_3, H_2O + 3H_2S = 2Fe\,S + S + 4H_2O$$

and the remainder according to the equation—

$$(2) \qquad Fe_2O_3, H_2O + 3H_2S = Fe_2S_3 + 4H_2O$$

Let us assume that, under ordinary conditions, 25 per cent. of the sulphuretted hydrogen is taken up according to the first equation, and 75 per cent. according to the second; and that the whole of the oxide present is thus saturated. Then oxide of the composition stated above would have, after fouling but before revivification, approximately the following percentage composition: Ferric sulphide (Fe_2S_3), 37·15; ferrous sulphide (FeS), 10·48; moisture, 30·78; sulphur, 1·91; fibre, wood chips, and impurities, 19·68. Or, 100 parts of the oxide put into the purifier would result, on fouling, in the production of 49·08 parts of ferric sulphide, 13·84 parts of ferrous sulphide, and 2·52 parts of free sulphur. It is assumed that the moisture in the oxide, and that formed according to the above reactions, remains without increase or decrease in the fouled material.

During revivification, the following reactions occur:—

$$(1) \qquad Fe_2S_3 + 3O = Fe_2O_3 + 3S$$

$$(2) \qquad 6FeS + 9O = 3Fe_2O_3 + 6S$$

Therefore, from both the ferric and the ferrous sulphides the products are only sulphur and ferric oxide, which for our present purpose may be regarded as re-assuming its original state of monohydration through the medium of the moisture present. Then, assuming that revivification is complete, and that there is no loss or gain of moisture extraneously, the revivified material will have the following percentage composition: Monohydrated ferric oxide, 38·05; moisture, 23·78; sulphur, 20·52; fibre and impurities, 10·87; wood chips, 6·78. Here are present all the constituents of the oxide as it was put into the purifiers; but sulphur is found also. Assuming the latter removed, we find that the moisture has increased from 18 per cent. of the material as it entered the purifier to 29·92 per cent.; and that the ferric oxide and other constituents have decreased in proportion. These are the changes which should occur if the reactions extended to every particle of material, and if moisture were not removed. But, as a matter of fact, such results are never obtained in practice; and not more than two-thirds of the amount of sulphur which theoretically should be obtained from completely fouled oxide is found in the revivified material. Also, moisture is driven off from the material by the heat of the reactions, so that the fouled oxide is drier than the oxide put into the vessels; and if no water at all is added during revivification, the revivified oxide is almost free from moisture. For the present purpose, it will be convenient to consider the reactions as extending to every particle of the material which naturally should be capable of action; for thus the maximum thermic effect will be found. Since this effect cannot in any case be exceeded, we know the extreme limit of danger in revivification, and can regulate and control the process accordingly.

One hundred parts of the oxide put into the purifier will, after fouling and revivification, under the conditions stated above, yield 56 parts of monohydrated ferric oxide, 34·99 parts of moisture, and 30·21 parts of sulphur; while the 26 parts of fibre, impurities, and wood chips will have remained unaffected. For the revivification of the fouled oxide, 15·10 parts of oxygen will have been required; and as this oxygen will have been taken from the atmosphere, 50·25 parts of nitrogen will have been introduced into the material, as well as a small amount of aqueous vapour, which may here be ignored.

We have now the necessary data as to the course of the

reactions which occur during fouling and revivification under the most favourable conditions. The calorific effect in each instance may be taken at the values employed by Mr. Poole in his paper; for the result will be approximately the same, if Thomsen's latest thermo-chemical determinations are used. The atomic weights of iron, sulphur and oxygen are for convenience taken at the round value of 56, 32, and 16 respectively: Then the combination of the equivalent weights (112 and 48) of the iron and oxygen to ferric oxide, has a calorific effect of 179,200 calories. The combination of equivalent weights (56 and 32) of iron and sulphur to ferrous sulphide, has a calorific effect of 35,504 calories. The combination of equivalent weights (112 and 96) of iron and sulphur to ferric sulphide, has a calorific effect of 106,512 calories. From these calorific data, and the composition of the fouled oxide, we are in a position to calculate the calorific effect of the revivification. One hundred parts of oxide prepared for the purifier will yield, on fouling, 49·08 parts of ferric sulphide and 13·84 parts of ferrous sulphide. To dissolve the union of iron and sulphur in these bodies, requires the expenditure of the following number of calories:—

$$\frac{49{\cdot}08 \times 106{,}512}{208} = 25{,}133$$

$$\frac{13{\cdot}84 \times 35{,}504}{88} = 5{,}584$$

Total . . . . 30,717 calories.

After revivification, the same 100 parts of oxide will have afforded 50·34 parts of ferric oxide. In the formation of this oxide, there will be liberated—

$$\frac{50{\cdot}34 \times 179{,}200}{160} = 56{,}381 \text{ calories.}$$

The net result of the dissolution of the sulphides and the production of the ferric oxide will therefore be the liberation of

$$56{,}381 - 30{,}717 = 25{,}664 \text{ calories.}$$

From this figure, the temperature which the mass can attain may be ascertained by finding the amount of heat required to raise the mass 1° in temperature. The following table of specific heats of the materials in the revivified oxide, is taken from Mr. Poole's paper:—

Water	= 1·000
Ferric oxide	= 0·166
Sulphur	= 0·200
Wood	= 0·300
Nitrogen	= 0·244
Aqueous vapour	= 0·480

Then from the composition of the revivified product from 100 parts of the prepared oxide we can find the equivalent weight of water, and thus be able to calculate the rise of temperature as if the whole mass were water. Thus—

	Parts.		Specific Heat.		Equivalent in Parts of Water.
Ferric oxide	50·34	×	0·166	=	8·36
Water	40·65	×	1·000	=	40·65
Sulphur	30·21	×	0·200	=	6·04
Wood, &c.	26·00	×	0·300	=	7·80
					62·85
To this must be added the heat expended in raising the temperature of nitrogen, viz.—	50·25	×	0·244	=	12·26
Equivalent in water . . .				=	85·11

Therefore the equivalent of 85·11 parts of water is affected by the liberation of 25,664 calories; and the rise in temperature of the mass will be 25,664 ÷ 85·11 = 301·5° C. Assuming that the mass before revivification was at 15·5° C. (60° Fahr.), the temperature attained would be 317° C., or 603° Fahr.

But before the mass attained this temperature, water would be evaporated from it; and the evaporation would abstract heat. The latent heat of steam is about 537; and if the whole of the free water present were evaporated, the abstraction of heat would be 34·99 × 537 = 18,790 calories. Taking this from the heat liberated, the net heat available, after evaporation of the water, would be—

$$25{,}664 - 18{,}790 = 6874 \text{ calories.}$$

Then instead of raising 34·99 parts of water to the final temperature, we have this weight of aqueous vapour to deal with; and the equivalent in water is—

$$34{\cdot}99 \times 0{\cdot}480 = 16{\cdot}80 \text{ parts.}$$

Substituting this figure for 34·99, we have the equivalent of the whole mass in water as equal to 66·92. Then the rise in temperature will be 6874 ÷ 66·92 = 102·7° C. Assuming, again, that the mass before revivification was at about 60° Fahr. (15·5° C.), the temperature attained would be about 118° C., or 245° Fahr.

This temperature would certainly cause dehydration of some of the ferric hydrate, and impair its value to a considerable extent. If the above computation be even approximately true, it is clear that oxide containing 18 per cent. of moisture when prepared for the purifiers, may, if it lose moisture in the vessels—as it almost invariably does—reach during revivification a dangerously high temperature, unless water is sprinkled upon it when spread on the revivifying floor. But the fouling seldom extends to every particle of the mass; and therefore the heat generated on revivification is less than that computed above. The oxide as removed from the vessels will, however, very rarely contain nearly 31 per cent. of moisture; and thus there is ample reason for anticipating very considerable rise in temperature of the mass.

The computation made above is at best a rough one, as many minor calorific effects have, for obvious reasons, had to pass unconsidered. It differs from Mr. Poole's computations in several respects, but chiefly in the important particulars that oxide as usually prepared for the purifiers is alone considered, and that the course of the fouling is taken to be approximately such as Mr. Lewis T. Wright observed in his researches on the action of sulphuretted hydrogen on oxide.* Under other, but improbable, conditions, Mr. Poole found, by calculations somewhat similar in character to those made above, that the temperature of the mass might reach 1310° C. (2390° Fahr.). But in reality the amount of moisture in the mass governs the temperature attained during revivification, and speculations such as some of those indulged in by Mr. Poole are quite valueless. The specific heat of water and the latent heat of its vapour are so high that other factors than the amount of moisture affect the result to a very slight extent. If oxygen replaces air for revivification, the temperature attainable will, however, be much greater than that given above. The deductions made apply only to oxide at its first fouling, as the sulphur contained in revivified oxide would tend to reduce considerably the temperature attainable at subsequent revivifications. The subject opened up by Mr. Poole's paper is a most interesting one—though speculative—and we hope to revert to it on another occasion.

WATER BILLS FOR 1898.

(*Concluded from p.* 277.)

The following Corporation Bills relate to, or contain clauses for obtaining, additional water-works facilities:—

The Bacup Corporation Water Bill is to authorize an enlargement of the undertaking purchased by the Corporation from the Rossendale Water-Works Company in 1894. Additional lands and easements for aqueducts are required within five years. An additional storage reservoir is to be constructed by impounding the Cowpe Brook in the boroughs of Bacup and Rawtenstall, subject to the discharge of compensation water at the rate of 330,000 gallons per day. The works are to be completed in ten years. All supplies may be by meter, at the rate of 2s. per 1000 gallons. An additional water-works loan of £140,000 is required, repayable in 60 years.

The Bury Corporation Bill is to authorize the construction of an additional reservoir, to be called the Lower Harden Clough Reservoir, on a stream known as the Cross Bank Brook, within the parish of Walmersley-cum-Shuttleworth, Lancashire. The work is to be completed in ten years. Provision is made for making up any deficiency of the water revenue by means of an additional water-rate outside the borough, and out of the borough fund within the borough as constituted prior to the Act of 1885. Power is sought for the extinction of water annuities by agreement with the annuitants. The sum of £80,000 is to be borrowed for the construction of new water-works, and £125,000 for the purchase of land in the drainage area, repayable in 60 years.

The Carlisle Corporation Water Bill is to enable the Corporation to obtain a new and improved supply of water from certain tributaries of the River Gelt. Numerous works are proposed to be constructed with this object, to be completed within ten years. The water of the Gelt is only to be taken when the flow is more than a million gallons per day, which is the quantity allowed for compensation. The Brampton Rural District Council are to be supplied with all the water they require from the new works at the price of 6d. per 1000 gallons. The existing water-works at Stoney Holme and Harrowby on Gallows Hill are to be discontinued, and the sites sold. An additional water loan of £150,000 is required. Surplus water profits are to be applied to reduce the rates for domestic supplies.

The Carmarthen Improvement Bill contains a part relating to water. A new storage reservoir is to be constructed in the parish of Newchurch for impounding the water of a brook which flows in the Nant Cwm Tawel dingle, and is a tributary of the River Gwili, which in turn flows into the River Towy. The works are to be completed within ten years. The rate for domestic supplies is to be 10 per cent. All supplies may be by meter. Additional water capital to the amount of £25,000 is required, repayable in 60 years.

The East Ham Improvement Bill contains a clause making the provisions of the Metropolis Water Act, 1871, relating to a constant supply of water, apply within so much of the East London Water Company's limits as lie within the district of the Council, who are to be deemed the Metropolitan Authority in those provisions mentioned.

The Edinburgh and District Water Bill is to enable the Trustees to construct additional water-works, comprising the raising of the water-level of the Gladhouse reservoir and the making of new aqueducts. The whole surplus waters above the reservoir are to be taken. The works are to be completed within seven years. The limits of compulsory supply are defined as the city of Edinburgh and the town and port of Leith. The other limits are to be extended so as to include the parishes

*See "Journal," Vol. XLI., p. 729.

of Lasswade, Newton, and Cockpen. An additional water loan of £200,000 is required.

The Hamilton Water-Works Bill is to enable the Water Commissioners to construct a reservoir on the stream called Kype Water, discharging compensation water at the rate of 750,000 gallons per day. The works are to be completed within seven years. Meters may only be used for other than domestic supplies. An additional water loan of £45,000 is required. Surplus water profits are to go to the improvement of the undertaking.

The Heywood Corporation Water Bill is to further extend the time limited by an Act of 1877, and extended by an Act of 1889, for the completion of the reservoir No. 1 sanctioned by the former Act. It is desired to borrow £55,000 for the execution of the works authorized by the Act of 1877, and not yet made; and £10,000 for strengthening the embankment of the Nayden Higher reservoir.

The Ilford Improvement Bill contains a clause to compel the East London Water Company and the South Essex Water Company, after one year, to afford in their respective portions of the district a constant supply of water under sufficient pressure to reach the tops of the highest houses.

The Ilkeston Corporation Bill is to authorize the construction of a well and pumping-station at the south end of the Little Hallam reservoir, to be completed within five years. All supplies may be by meter. The additional sum of £30,000 is to be borrowed for water-works purposes, repayable in 50 years. Any surplus profits are to go to the district fund.

The Keighley Corporation Bill is to extend by ten years the period limited by an Act of 1891 for the construction of certain authorized water-works. A new storage reservoir is to be constructed upon the Sladen Beck, in the parishes of Stanbury and Haworth, in the West Riding, to be completed within ten years. The Urban District Council of Oakworth are to pay 9d. per 1000 gallons for their water. The additional sum of £45,000 is to be borrowed for water-works purposes.

The Paignton Improvement Bill contains provisions for enabling the District Council to lay on and supply sea water within the district. The water-rates to which the Council are entitled are to be payable half yearly in advance, instead of quarterly in advance as heretofore.

The St. Helens Corporation Bill contains a part relating to water. A reserve fund of £20,000 is to be sanctioned. The Corporation are to be authorized to supply fittings; and water-rates are to be assimilated to parochial rates within the meaning of the Preferential Payments in Bankruptcy Act, 1888.

The Tynemouth Corporation Water Bill is to empower the Corporation to obtain water from the River Font, in the county of Northumberland—the old sources of supply having partially failed, so that the deficiency has been made up by purchasing from the Newcastle and Gateshead Water-Works Company. The contemplated new works comprise an impounding reservoir to be formed upon the valley of the River Font; the works to be completed within ten years. Water is not to be taken from the Font whenever a less quantity than 167 cubic feet per minute shall be passing down the stream. The sum of £430,000 is to be borrowed for water-works purposes. Surplus water profits are to go to the general district fund.

The Wigan Corporation Bill contains a clause authorizing the construction of settling-tanks upon lands in the township of Haigh. The sum of £3000 is to be acquired for this purpose, repayable in 60 years.

The Wishaw Water Bill is to authorize the Commissioners to construct additional water-works, comprising several weirs and aqueducts for the taking of the waters of the Potrenick Burn, the Potrail Water, and the Peden Burn. The works are to be completed within five years. The supply is to be compulsory within the burgh of Wishaw. All supplies may be by meter. Water-rates are to be levied so as not to exceed the expenses. Additional water capital to the amount of £95,000 is required.

The Yeovil Corporation Bill is to sanction the construction of additional water-works, comprising two collecting-ponds and accessory works, to be completed within eight years. The sum of £50,000 is required for water-works purposes, repayable in 60 years.

The Bury Managership.—Fifty-one applications have been received, in answer to the advertisement which appeared in the "JOURNAL," for the position of Manager of the Bury Gas-Works, in succession to Mr. W. H. S. Gendall. This number has been reduced to six by the Sub-Committee who have the selection in hand.

The Formation of Alkaline Carbides.—The subject of the conditions of formation of alkaline carbides and the carbides of magnesium and of the alkaline earths, was recently dealt with by Mr. Henri Moissan before the Paris Academy of Sciences. He showed that metallic potassium, if left for a long time in acetylene, slowly but completely decomposes the gas; giving hydrogen and C_2HK. Sodium gives a similar compound when sealed up with liquid acetylene, and this C_2HNa, heated in a vacuum, liberates pure acetylene; leaving sodium carbide (C_2Na_2) behind. At a red heat, this is decomposed into carbon and sodium. The potassium compound behaves similarly; neither sodium, potassium, nor magnesium carbides being able to exist at the temperature of the electric furnace.

PERSONAL.

Mr. F. D. MARSHALL, Engineer-in-Chief of the Danish Gas Company, asks us, to prevent miscarriage of letters, to notify that his address is Danish Gas Company's Offices, Frederiksberg Allée 56, Copenhagen V, Denmark.

Mr. JAMES ASPELL, who was for many years the Chairman of the Southport Water Company, has resigned his seat on the Board, owing to ill-health; and the vacancy has been filled by the appointment of his son, Mr. JOHN ASPELL.

The Gas and Electricity Committee of the Bradford Corporation have selected Mr. J. H. DUXBURY, the Assistant Manager of the Bradford Road Gas-Works of the Manchester Corporation, for the post of Assistant Engineer to the Gas Department.

The Gas and Water Committee of the Goole Urban District Council have decided to recommend the Council to appoint Mr. M. DUNN, of Selby, Manager of the Gas and Water Works. There were thirty-six candidates for the position, in answer to the invitation contained in the "JOURNAL" for the 18th ult.

Mr. H. J. WILDIN, the Borough Accountant of Stoke-upon-Trent, has been selected by the Directors of the Staffordshire Potteries Water Company to fill the position of Secretary, rendered vacant by the retirement of Mr. J. B. Piércy on account of failing health. There were fifty candidates for the appointment, advertised in the "JOURNAL" on the 18th ult.

Mr. GUY S. DAVIES has obtained the appointment, advertised in the "JOURNAL" a few week ago, of Manager and Secretary of the Western Valleys (Mon.) Gas and Water Company, in succession to Mr. Octavius Thomas. Mr. Davies—a pupil of Mr. T. Canning, Assoc.M.Inst.C.E., the Engineer and Manager of the Newport (Mon.) Gas Company—was recently employed in the Manager's Department of that Company. He passed second class in the Honours Grade at the last examination in "Gas Manufacture" at the City and Guilds of London Institute.

Last Tuesday, Mr. R. BRIDGE, the Engineer and Manager of the Doncaster Corporation Gas-Works, entertained the men in his department at supper, in commemoration of the completion of the twenty-first year of his management. During the after proceedings Mr. Bridge was presented with a pair of beautiful bronze ornaments and an umbrella. Mr. Bridge, acknowledging the gifts, said they had taken him altogether by surprise; and he thanked the men under him most heartily for this evidence of the good feeling that existed between him and them. In some subsequent remarks, he stated that in the twenty-one years he had been in the service of the Corporation the consumption of gas had risen from 50 to 150 million cubic feet per annum.

The Forthcoming Acetylene Exhibition.—We have already announced (*ante*, p. 76) that the exhibition of acetylene and calcium carbide projected towards the close of last year is to be held in Berlin. The date fixed is from the 6th to the 20th prox.; and the arrangements will be carried out by the German Association for Acetylene and Calcium Carbide. The exhibits will be in four groups, comprising acetylene generators, lamps, purifiers, and mixing apparatus; acetylene burners, motors, and soldering tools; calcium carbide electric furnaces, and electrodes; and various appliances used in this branch of manufacture. In connection with the exhibition, there will be a congress on scientific and technical problems connected with the new industry.

The Local Government Annual, 1898.—We have received a copy of the above-named work from the Editor, Mr. S. Edgecumbe-Rogers. This is the seventh year of publication; and in several respects the present Annual is an improvement upon its predecessors. The new features of this edition comprise an abstract of the local government legislation of 1897, summaries of the principal legal decisions of the year, the chief powers of the London County Council and of the London Local Authorities, and a quantity of statistical information dealing with public health and other matters. The book contains a complete directory of all public bodies, with the names of the principal officials. It will therefore be found useful to all who are engaged in administering the various Acts regulating Local Government. It is published at the office of the "Local Government Journal," Dorset Street, E.C.

Society of Engineers.—The first ordinary meeting of this Society for the present session was held on Monday last week, at the Royal United Service Institution, Whitehall, S.W. The outgoing President (Mr. G. Maxwell Lawford) occupied the chair at the opening of the proceedings, and presented the premiums awarded for papers read during the past year. The Rawlinson Premium was obtained by Mr. R. E. Middleton, M.Inst.C.E., for his paper on "The Pollution of Water and its Correction," an abstract of which, with some notes of the discussion thereon, was given in the "JOURNAL" for the 4th ult. Mr. Lawford then introduced the new President (Mr. W. Worby Beaumont, M.Inst.C.E.), who delivered his Inaugural Address, which was mainly devoted to the subject of mechanical motive power, which he claimed to be the greatest source of the increased prosperity of this and other countries during the past sixty years. Referring to gas-engines, he said this type of motor was old enough now to make it worth while to "scrap" many of the earlier forms which are still working perfectly, except that they are consuming from 30 to 50 instead of from 15 to 20 cubic feet of gas per horse power.

NOTES.

Compressed Air Tramcar Working.

In regard to the question of working tramways by mechanical power, some valuable data have been published by Mr. E. Pettee, the Engineer of the American Air Power Company, which go to show the actual conditions of the problem for different systems of working. It appears that compressed air cars were put upon a section of the Third Avenue Railroad in New York, to make a round trip of 4·11 miles. The cars run from 12·50 to 16·67 miles on a single charge of air. The running cost per car-mile works out to 8·95d. inclusive; but considering only the proportion of labour actually utilized in the service, the running expenses on a completely equipped line would not be more than 6d. per car-mile. Over an average of twenty-two electrical tramroads in the State of Connecticut, the cost per car-mile in 1896 was 7·22d. The consumption of air per car-mile is about 400 cubic feet, at atmospheric pressure. The cost of compressing air to 2500 lbs. per square inch is calculated at from 3·37d. to 1·50d. per 1000 cubic feet, according to the size of the station. Assuming that the average consumption of air per car-mile can be kept as low as it is at present, the average cost of this kind of power would be less than 1d. per car-mile, which is believed to be only two-thirds the cost of electric power operating by the trolley-wire system. No comparison is made with the gas-power tramcar.

Pickling Iron for the Removal of Scale.

It is now generally understood that the complete cleansing of new structural iron from mill-scale is a necessary preliminary to its proper treatment by oiling or painting for the prevention of rust. At the same time, this cleansing process has not been easy to perform satisfactorily by the methods ordinarily adopted for the purpose. Sometimes the scale is very hard and adhesive, and of considerable thickness. The usual practice is to pickle the metal in a weak acid solution for a period of time varying from 2 to 24 hours—the acid being subsequently washed off. Many attempts have been made to quicken the process and reduce the cost of the treatment. One of the early experiments in this direction consisted in making the iron the anode in an acid bath; thus converting the simple pickling into a galvanic process. This was found to result in pitting the metal, because the iron, where it was not covered with scale, was more readily attacked than the scale itself, which is composed of the magnetic oxide. To overcome this difficulty, the current was reversed; the iron becoming alternately anode and cathode. Mr. Sherard Cowper-Coles contributes to the "Electrical Review" an illustrated description of a pickling-vat constructed for such a process, the work being suspended on bars placed across the vat. To quicken the operation and reduce the electrical resistance of the solution, it is found advantageous to heat the fluid, which is done by means of a lead pipe through which exhaust steam is passed. The arrangement of the apparatus appears to be good. A point is made of the removal of the heavy scale as soon as it is detached, so as to minimize the consumption of acid.

A Coal-Carbonizing and Electricity-Generating Combination.

Our contemporary the "Electrician" reports that Professor Short, of Cleveland, Ohio, is responsible for a patent method of combining carbonizing coal with the generation of electricity upon a large scale. The invention consists of a gas-retort through which coal is thrust by a reciprocating rod, becoming carbonized during its passage; the coke falling into an electrolyte fed with oxygen. Here it is exposed to an electrode of lead, or lead oxide, and is consumed, with the production of current. The advantages claimed for the combination are that the heat necessary to carbonize the coal not only produces gas in the ordinary way, but suffices to bring the coke itself to a temperature suitable for its electrolytic oxidation. The comment upon this suggestion is that while an economy of heat would certainly result from using coke red hot as it is drawn from the generators, the saving on this head would not be very large; so that it would remain doubtful whether it would be worth while to encumber an electricity generator with a gas-making plant for the purpose of securing this economy. The main question, however, is as to the nature and efficiency of the generator itself. Our contemporary accordingly asks: "Of what does the electrolyte consist? Can it act for an indefinite time, being fed with coke and oxygen; or has it to be renewed? What becomes of the ash of the coke? What fraction of the energy of the coke is converted into electrical energy?" and so forth. In default of plentiful and accurate details in respect to these points, our contemporary is sceptical as to the value of Professor Short's so-called invention for combining gas manufacture with the production of electricity direct from coke.

The Chemistry of the Hydrocarbons in 1897.

Among the conquests of chemistry catalogued by the "Engineer" as belonging to the year 1897 is the commercial production of synthetic indigo at a price not more than about one-third greater than that of the best natural dye-stuff. The same interesting circumstance was chronicled in "The Times" as having been due to the perseverance of the Badische Anilin und Soda Fabrik in working in the direction indicated by Professor von Baeyer, of Munich, who first effected the synthesis in his laboratory sixteen years ago. One report states that the new development has already alarmed the indigo trade, which does not forget the history of alizarine and the madder cultivation. Another report has it that the dyeing results obtained with the artificial product are not so good as those attending the use of the natural article, because, curiously enough, the former is too pure. The best natural dye has an appreciable admixture of cognate substances, the functions of which in the dye-vat are not yet fully understood, though the effect is beneficial. It follows that the action of these auxiliaries must be studied, and then those that are essential must be synthesized and added in regulated proportion to the pure indigotin. When this has been done, artificial indigo will be on an equal footing with the natural dye-stuff; and choice between them will be simply a question of price. Another triumph of patient investigation of the hydrocarbons is to be found in such substances as artificial musk—a nitrated hydrocarbon; ionone, or artificial essence of violets; and other synthetic scents. The musk is stated to be worth £500 per pound; and yet the coal tar from which all these products are derived, is actually cheaper than it was before one of them was heard of.

The Theory of the Gas-Producer.

Mr. Alleyne Reynolds has written to "Engineering" upon the theory of the action of the gas-producer. He commences by remarking that he has in many instances failed to explain observed facts by accepted theories. Take, for example, the production of "crude carbon monoxide gas in the gas-producer." He puts it that the usually accepted theory of this operation is that "air entering the bottom of the producer burns with the coal, forming CO_2 at a *high temperature;* this rising through the hot coal becomes reduced to CO, with loss of heat." As against the theory, he advances the following facts of producer working. "(1) That the scaffolding of slag in producers, and all other appearances, point to the hottest zone in a well-managed producer being near the top of the coal. (2) That a strong lambent flame will issue from a leak, even only a few inches above the air-inlet of a blown producer. (3) That, especially in producers worked by forced draught, a moderately shallow fire produces the most combustible gas." Mr. Reynolds has his own explanation of the phenomena of gas-producer working, based on what he styles a very ambitious theory of his devising. This is a new "law of dissociation," formulated as follows. "If a certain chemical reaction be exothermic, and give rise to the evolution in the free state of a certain number of calories, then under the application of extraneous thermal force equal to this number of calories, the reaction cannot take place." According to this view, the molecule of gas gets hotter on its journey from the bottom of the producer; the temperature of dissociation of CO_2 being reached in the upper zones of the producer. Hence this gas cannot exist here. At this zone also the slag is fluid—cohering and scaffolding as it sinks. Over-blowing will make a gas low in CO_2, rich in CO, but also containing free oxygen. The two latter will confine in the flues as the temperature falls, and the gas as delivered to the furnace will be low in CO and rich in CO_2. On the other hand, very slow working of a producer by natural draught will also yield a good deal of CO_2, inasmuch as the loss of heat by radiation from the walls of the producer is greater, and the conditions under which combustion of the coal takes place more approximate to the free state. The writer holds that CO_2 should always be regarded as originating in the formation of CO; this gas being afterwards burnt into the product of higher oxidation.

The Award in the Harrogate Water-Works Arbitration.—Mr. Shiress Will, Q.C., has made his award in the above-named arbitration, the proceedings in which were recently reported in the "JOURNAL" (*ante*, pp. 186, 238). It may be remembered that Mr. E. K. Burstal put the value of the Company's undertaking at £242,800. Mr. G. H. Hill, on the other hand, put it at £168,667. The Umpire fixes the price at £187,000.

Institution of Mechanical Engineers.—The 51st annual meeting of this Institution was opened in the hall of the Institution of Civil Engineers, Great George Street, Westminster, last Thursday. The chair was occupied during the earlier portion of the proceedings by Mr. E. Windsor Richards, the retiring President, who introduced to the meeting Mr. Edgar Worthington, who succeeds Mr. A. Bache as Secretary. The report of the Council stated that at the end of last year the number of names on the roll was 2496, compared with 2359 at the end of the previous year. During the twelve months, 227 names were added; the loss by death being 30, and by resignation or removal 60. The receipts during the year were £7656, and the expenditure £6202. The report was adopted. The result of the ballot for the election of the Council was announced; Mr. S. W. Johnson being elected President, and Mr. A. Keene and Sir W. White, Vice-Presidents. Sir F. Bramwell moved a vote of thanks to Mr. Richards, who had, he said, been connected with the Institution for about a third of a century. Mr. Head seconded the motion; and it was agreed to. The discussion on a paper read at the last meeting by Mr. Philip Dawson, on "Mechanical Features of Electric Traction," was then resumed. On the following evening, Professor Burstall's first report to the Gas-Engine Research Committee—describing the apparatus and methods employed, and giving the preliminary results—was presented. A discussion was opened upon it, and adjourned till the next meeting.

TECHNICAL RECORD.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Annual Meeting of this Association was held last Thursday, at the Holborn Restaurant. Notwithstanding the strength of the Association, there was only a moderate attendance of members—there being quite a noticeable absence of many of the familiar faces of members of the Southern branch.

At the commencement of the proceedings, the chair was occupied by the retiring PRESIDENT (Mr. J. W. Helps, of Croydon).

INDUCTION OF THE NEW PRESIDENT.

Mr. HELPS said his last duty as President of the Association was a pleasing one. It was the introduction of Mr. R. Beynon, of Torquay, the President for the current year. He was perhaps not so well known to many of the Southern members as he was to those in the south-west of England. But, speaking from experience, he (Mr. Helps) could say that the more they saw and knew Mr. Beynon, the more they would like and esteem him.

The PRESIDENT, on taking the chair, acknowledged the kind manner in which Mr. Helps had introduced him.

CONFIRMATION OF MINUTES.

On the suggestion of the PRESIDENT, the minutes of the general meeting held in November last were taken as read.

ANNUAL REPORT OF THE COMMITTEE.

The HON. SECRETARY (Mr. J. W. Helps) read the report of the Committee on the twenty-fourth year's work of the Association. This report, they said, they presented with unmixed satisfaction; the retrospect being particularly gratifying. Referring to the temporary vacation of the office of Hon. Secretary by Mr. Helps for the more conspicuous post of President, the Committee stated that in this capacity he had carried out the duties in the manner the members expected of him, and had fully justified their choice. The year, the Committee observed, had been an important one, being the first of united work since the amalgamation with the South-West Association; and the unqualified success of each of the meetings justified the conviction that the Association —now the largest "District" Association—had entered upon a fresh and enlarged career of usefulness. The loss by death of Mr. A. Brown, of Woodford, was recorded; while, on the other hand, it was stated that the membership had been augmented by the addition of three new names. The Committee then reviewed the proceedings at the three meetings held during the year, after which they alluded to the satisfactory financial condition of the Association. The receipts, including £80 16s. 5d. brought forward, amounted to £152 4s. 5d.; and the expenditure having been £64 11s. 5d., a balance of £87 13s. remained. The Committee felt that the thanks of the members were due to Mr. D. H. Helps for the ready way he undertook, and the very admirable manner in which he had carried out, the arduous and important duties of Hon. Secretary during the term of his brother's presidency.

On the motion of Mr. F. W. CROSS (Lea Bridge), seconded by Mr. W. E. PRICE (Hampton Wick), the report was adopted.

THE EX-PRESIDENT THANKED.

The PRESIDENT said he had great pleasure in proposing a vote of thanks to the ex-President for the very careful and able way in which he had carried out the duties of the chair during the past year. It needed no words of his to eulogize the efforts Mr. Helps had made in the conduct of the business of the Association. He had shown the same tact in directing their affairs as he had exhibited in conducting the work of his own Company.

Mr. CHARLES GANDON seconded the motion with much pleasure, more especially as he saw that the Association were again to have the assistance of Mr. Helps in his old capacity. He cordially agreed with the President as to the way in which Mr. Helps had carried out his duties as President. They knew, from past experience, the admirable manner in which he did his work as Hon. Secretary; and, therefore, he (Mr. Gandon) was pleased to see him back again at his post.

The motion was heartily adopted.

Mr. HELPS sincerely thanked the mover and seconder of the resolution for the very kind words they had used, and the members for the cordial way in which they had endorsed them. His year of office had been a particularly pleasant one; and he had thoroughly enjoyed it. He had to thank the Committee and the late Secretary for the manner in which they had co-operated with him in making the year one of the most successful in the annals of the Association.

NEW MEMBERS.

On the proposition of Mr. R. HERRING (Dover), seconded by Mr. W. B. RANDALL (Waltham Cross), Mr. S. Y. Shoubridge, of Sydenham, and Mr. J. C. Belton, of Redhill, were elected members of the Association.

The PRESIDENT then read the following

INAUGURAL ADDRESS.

Gentlemen,—I must first of all thank you again most heartily for having placed me in this proud position. I must confess that, when I first heard my name mentioned in connection with this post, serious misgivings arose in my mind as to my fitness and ability to occupy it with any degree of success—especially so as I have to follow one who has filled the chair with such conspicuous ability and tact. However, having allowed myself to be over-persuaded, I address myself to this great task, resolving to take as my motto *Nil Desperandum*, and trusting to each individual member to make my work as light as possible, and to be lenient in judgment.

I would commence by stating that I have no new process to bring to your notice, nor the results of any experiments to offer for your criticism; but that I hope to interest you with several experiences that I have met with since being in charge of my present works. My time has so fully been taken up with extensions and improvements to the various departments, that until this year I have had very little time for the prosecution of such experiments.

Seeing that the works under my charge are so little known to any of you, a very brief description of them may not be inappropriate. The works are situated on the shores of Torbay, and in one of the most beautiful parts of the bay, about midway between Torquay and Paignton, close by the Great Western Railway's branch line to Kingswear, from which a siding runs alongside the coal-stores, the floors of which are 10 feet below the rail level. They are three in number, and hold about 4000 tons when full. There are two retort-houses, distinguished as the old and new; engine and boiler house; scrubbers, 40 feet high and 9 feet diameter; Laycock's washer-scrubber; four 20 feet square purifiers; no less than four holders; and our annual make amounts to 146 million cubic feet. Turning now from this cursory description of the works, and going back to the coal-stores, you will see that we are fortunate in being able to store a large amount of coal under cover; the quantity being about eight weeks' stock, at our maximum consumption of 75 tons per diem. Situated as we are a long distance from the coal-fields, and depending on water carriage, this is by no means too large a stock to have on hand; for on one occasion we were reduced, owing to continuous heavy weather, to within five days' consumption. On the other hand, the storage of this amount of coal is not without its anxieties, owing, of course, to the liability of spontaneous combustion. On one occasion only has this occurred—and this was in the winter after I was placed in charge—though at several times there has been a considerable rise in temperature. The cause of this coal firing was as follows: The cellar in which it was placed had been excavated about 3 feet below the level of the others, and though a pipe had been placed to act as a drain, it had become choked. It thus allowed the water to rise; and the natural result followed. This cellar has since been brought up to the level of the others. I now make it a rule to thrust iron rods into the heaps, which are withdrawn at stated times, and the temperature tested. This, at any rate, is a rough and ready means of guarding against any undue rise in the temperature, and so enables the manager to avoid one of the most unpleasant experiences that can fall to his lot.

I see it has been suggested that the best way to secure oneself against the evil results of a coal strike or adverse elements would be to store in the open (say) eight weeks' consumption calculated on the maximum daily amount carbonized, which should only be drawn from on an emergency arising. With Newcastle unscreened coal containing, as it does, a large amount of small, I should be afraid to try this plan; but it might answer with screened coal, though I should think, even then, there would be a very considerable diminution in the results obtainable.

Finding that our carbonizing plant in 1894 was too small for the demands made upon it, we determined to build a new retort-house; and after much consideration, we decided to erect one with a stage floor. It was commenced in March of the following year, and finished by about the middle of December; and it was furnished with Klönne's regenerative furnaces from drawings supplied by Mr. R. O. Paterson, of Cheltenham. There are six benches, of eight retorts each, 20 feet through, fired on one side only, as usual. The retorts are fitted with self-sealing mouthpieces, with dished steel lids. The ascension, bridge, and dip pipes are 5 inches in diameter; and the hydraulic mains are quarter circle in section, and in separate sections, fitted with combined weir and tar valves (of which more hereafter). There are the usual tar and foul mains. The house is also fitted with West's coal breaking, elevating, and conveying machinery, driven by an "Otto" gas-engine, and drawing and charging machines for manual labour. The total cost of the building, retort-benches, two chimney stacks, and machinery, worked out to about £80 per mouthpiece. This is rather high; but, of course, seeing the distance we are from the fire-brick and iron centres, and taking into consideration the fact that we were pressed for time, the amount cannot be considered an unreasonable one. If, however, I had to do the work again, I should proceed on rather different lines. For one thing, I would not have five or six separate contractors to do the work; for though it may be slightly cheaper, it entails no end of anxiety for the Company and their Engineer, besides being difficult to fix blame on either one of them for delays.

As I have said, we finished the retort-house in the middle

of December, and immediately started to work. After we had mastered the method of manipulating the various dampers, we proceeded for some time working very comfortably, and found the benches easy to heat regularly, and very economical in the consumption of coke. This state of affairs lasted for about six months; and then we began to experience the nuisance of stopped ascension-pipes. We tried all sorts of remedial measures—such as lowering the heat, protecting the ascension-pipes from the radiant heat of the benches, placing wet ashes on the mouthpieces—but nothing seemed to afford us any relief; and so matters drifted until just before Christmas, when it was no uncommon thing to go into the retort-house and see whole benches blazing round the mouthpieces.

It was just about the same time that a letter appeared in the "JOURNAL OF GAS LIGHTING" asking for help, or rather advice, for one who was in a similar predicament; and though the inquiry did not emanate from me, it might well have done so. The replies, it will no doubt be within your recollection, were many and varied; and among them was one from M. Irminger, of Copenhagen, suggesting the coating of the retort for about 1 or 2 feet inside the mouthpiece with a stiff wash of fireclay, and giving his reasons for this procedure. It seemed reasonable; and so I determined to give it a trial on the following day. That night I went to bed with a light heart, thanking M. Irminger for his remedy, and resolving to write the "JOURNAL" next day giving the result of the experiment. Never a stopped pipe the whole day. But, on going into the retort-house next morning, I found matters just as bad, if not worse than before; so the letter was never written. Still something had to be done, so taking advantage of the Sunday stop, we removed the whole of the handhole covers of the hydraulics, to examine the state of things there. They appeared at first sight to be in order; the dip-pipes being sealed in an inch of liquor. But further examination showed that there was a lot of thick tar at the bottom. The weir-valves, I should say, were constructed with a screen in front of them, so as to cause the tar to flow away first; thus ensuring that the dip-pipes should be sealed in liquor only. This is no doubt an excellent theory, and one that would work well with tar of a lighter sort than that obtained from Newcastle coal. I had cause, however, to think that this action did not take place; for though everything appeared right, the benches had been stopped for a period of four hours before they were opened, and the liquor thus had had time to resume its normal level—an examination the day before by gauge, when working, having shown a seal of from 2 to 2½ inches. The hydraulics were cleaned out and refilled with ammoniacal liquor; and we found a decided improvement in the working next day. As a temporary measure, therefore, I procured a large hose and flushed out the mains every day. This was better; and we managed to go on to the spring, when I resumed working in the old house. I then had all the ascension-pipes taken down to give them a thorough clean out. They presented a sorry sight, some of them having barely a 2-inch hole through them, and the deposit round the pipes so hard that it was only with considerable difficulty we succeeded in clearing them. I also took out the dips and shortened them an inch, so as to ensure working with a lighter seal, and laid on a supply of ammoniacal liquor to each section of the mains, and then restarted working them.

All this work, however, has not quite removed the difficulty, for we still suffer to some extent. The coal we mostly use is New Pelton unscreened, which contains a large proportion of dead small; and this is no doubt greatly increased by passing through the breaker and other machinery. Therefore, when put in the retort, a large quantity of this dust is carried off with the first rush of gas, and takes the earliest opportunity of depositing itself, along with the heavier tar, on the sides of the ascension-pipes. Working with about the same heats and seals in the old retort-house, we never experienced anything like the trouble. This seems to confirm the view taken by our late President of the cause of these stoppages—viz., that it is owing to the rapidity with which the charge is put in and the door closed.

While on the subject of this house, there is also another circumstance which may be interesting to you, and that is the change which I have observed takes place in the character of the tar. The gas from the house is taken away by an 18-inch steel foul main, and connected to the 24-inch steel main in the old house, and from thence by an 18-inch cast-iron main to the condensers, which are annular; so that altogether it travels about 400 feet before entering these. Well, sometime after commencing to carbonize coal in this new house, we observed that the tar which ran down over the sides of the seal-cups into the trough in front of the condensers commenced to leave a deposit of a very gritty nature, and also that the tar in the trough became coated over with a crust similar to a thin coating of ice on water. From the fact of its being easily melted by steam, it must be a formation of naphthalene mixed with a proportion of extremely fine dust; but it is never observed when we are working in the old house. This is rather a disquieting incident, insomuch that I find the bottom of our new tar-tank is covered with a tough pasty deposit, which chokes up the strainer of the suction pipe belonging to the tar-pump.

Speaking of tar-wells, reminds me that we had, in our old one, a practical experience of the unwisdom of allowing the water from the lime purifiers to drain back there. It had been allowed to do so for some time, until an increasing difficulty was reported to me of filling the contractor's tar-tanks, though at the same time tar was constantly being pumped through the scrubbers. This led to an investigation; and on sounding the well, we found it nearly two-thirds full of a thick pasty deposit. How it became so full at first puzzled me, until I happened to notice that the water, which was being pumped from a syphon in connection with the purifiers and allowed to run into a seal-cup full of ammoniacal liquor, caused a white precipitate to be thrown down, which, of course, accounted for the difficulty. The well being 20 ft. long, 12 ft. wide, and 12 ft. deep, with only a 2 ft. 6 in. square manhole in the centre, the problem of how to get this deposit out without stopping work in any way became a difficult one. We managed to improvise a dredger by erecting a pair of poles over the manhole, and providing a crab and chain connected to a strong scoop furnished with a projecting point in which a couple of holes were drilled. The *modus operandi* was then as follows: A man stationed at the winch lowered away, while another standing over the manhole furnished with a long pole, which he inserted in the holes already mentioned, pressed the scoop back to the end of the well, and also down into the thick material at the bottom. The man at the winch then reversed his action and hoisted it up; and after about a week's labour we got everything clear, and our apparatus, if primitive, had the merit of being successful.

Passing on to the purifiers, in which lime only is used, they are worked in rotation; and having had a convenient outlet for spent lime in the shape of the sea and beach, the cost of this method of purification has not proved excessive. Our account under the heading of purification and sundries was working out to about 7·29d. per ton of coal carbonized; and at the same time we have kept down the sulphur to an average of about 10 grains per 100 cubic feet, as reported by the official tester to the Company. Some seven years ago, owing to the numerous complaints we had from people in Torquay and Cockington of the smell arising from the spent lime during certain winds, we were forced to take steps to minimize the nuisance, and for some time always emptied the boxes by night. This answered fairly well during the winter; but in the summer, owing to the inhabitants sleeping with the windows open, we were again requested to take immediate steps for the prevention and cure of this noxious smell. At that time we were prevented from using oxide owing to the want of revivifying space; so we had recourse to drawing air through the spent box for three days and nights, and passing these fumes into a small oxide purifier. We have kept to this process ever since, having found it work fairly well; though on one occasion, owing to one of the gas valves leaking and the oxide firing, we had a small explosion in the purifier-house. Now we have to face another complaint—this time from the newly-appointed Devon Sea Fisheries Commission—who object to the deposition of spent lime on the shore, on account of the harm it is said to do the immature fish. But I am glad to say that at last the farmers are coming to our rescue, and are beginning to realize what a valuable manure is, so to speak, at their gates, for there is a considerable demand springing up for it; and I am entertaining hopes that in the near future we shall be able to sell, instead of giving it away. I have not for many reasons yet tried what the admission of a percentage of air would do to minimize the cost of purification. Judging from the numerous reports of its success in the "JOURNAL OF GAS LIGHTING" and other papers, it seems under certain conditions to give great satisfaction; and I hope to try the process at an early date.

Our storage accommodation in 1894 being about 25 per cent. under our largest output, my Directors consented to build a new holder and tank; and I was accordingly instructed to get out the plans and specifications, and to fix on the site. I determined to build as large a holder as I could between one of our existing ones and the governor-house, and so made the drawings for a tank 114 feet in diameter and 27 feet deep, to contain a three-lift holder, of which two lifts were to be erected at once. The contracts were let; and the excavation was commenced in May. I had had one trial pit sunk adjacent to the site, in order that the contractor might judge the sort of soil and rock he would have to contend with. This indicated that the excavation would be fairly easy; being through a soft red sandstone, with occasional thin seams of a stiff clay, and of a slightly harder texture as we reached the full depth. It was found, however, on commencing the excavation, that this guide was a most deceptive one; and for nearly the whole circumference of the pit the excavation was in a sort of bastard slate foundation, or as we call it in Devonshire "shillit." For the most part, it was almost more easily excavated than the sandstone; and only as we reached the bottom was any recourse had to blasting. One of the hardest pieces was adjacent to the existing holder, from which it was only 10 feet distant; and this caused us a good deal of anxiety, as in spite of extra timbering, the embankment surrounding it showed signs of settlement, and the water which drained in on that side was distinctly "gassy." Another hard place was almost immediately opposite this, and was where the inlet and outlet pipes had to come in. The rock here was of an entirely different nature; consisting of a very hard sandstone, which gunpowder would not touch, and we had therefore to use dynamite. The excavation was made in the usual way, by digging a trench round the whole circumference 12 feet wide, and closely timbered and strutted throughout. Water did not trouble us very much, as in spite of unfavourable weather a couple of 2-inch syphons leading to the beach were sufficient to

keep us clear until we came to the bottom, when a small pulsometer was set up.

The excavation being finished, we put a ring of 4-inch drain-pipes round the whole circumference, to lead the water to the sump, and proceeded to put in the concrete foundations and chambers for the inlet and outlet pipes. We then brought up the walls, which were of brick and cement, backed with clay puddle, to the height required. The centre portion was next taken out, and the cone formed, concreted over, and finished with neat cement. On Jan. 1, 1895, the contractor for the iron-work took possession, and commenced the erection of the holder, which was finished by May 30. Water was then run into the tank, which proved to be a sound one, though not absolutely tight. The inlet and outlet pipes (which were of steel 27 inches in diameter, with cast-iron syphons and duckfoot bends) were finished off, and the holder inflated with air for testing and adjusting the carriages. We then sealed the pipes with water, and tested the holder for soundness; and this having proved satisfactory, we proceeded to connect the pipes to the inlet and outlet mains.

I was congratulating myself that at last my anxieties were over, when word was brought that the men could not pump the water out of the inlet-pipe. I had the cover removed, and found it half full of water. We therefore attached a steam-pump, which pumped the water out after about one hour's work; and I was then lowered down the pipe on the gas-holder side, to see what was the cause. I found that the duckfoot bend had cracked right across the bottom, and that the water was rushing in almost as fast as we could pump it away. This was a very serious matter; and at first the only thing to be done appeared to be to empty the tank and take out the bend, which means at least six or seven weeks' hard labour, besides running the risk of damaging the tank. As I wanted to let another holder down for repairs, I determined to try and stop the leak in a different way. I first of all satisfied myself that the incoming water was not from the tank, but from the land springs, on account of the water only rising in the inlet-pipe to a certain height, which was about 10 feet below the level of the water in the tank. I then coupled up the steam-pump to the sump-hole, which fortunately had been left open, and proceeded to pump the water out of that. This reduced the inflow to a very small stream; and a man was able to go down and drill an inch hole in the bend just above the crack. Into this was driven a piece of tapered iron pipe, and then a length screwed on sufficiently long to reach the top. The water in the sump was then allowed to regain its natural level, and we poured down the 1-inch pipe portland cement grouting; feeding it in with a small iron rod. After letting it stand for about twelve hours, we again pumped out the water from the pipe, and found to our relief and satisfaction that everything was tight. To make assurance doubly sure, a $\frac{3}{8}$-inch wrought-iron plate was fashioned to the bend, bedded in with red and white lead, and screwed on with set screws; and we have experienced no trouble with it since. As to the cause of this unfortunate accident, the contractor and myself were at variance—as was probably only to be expected. He held that it was brought about by a settlement of the wall of the tank; but as soundings and levels taken on the curb showed no signs of settlement, and also the rest-stones were perfectly true one with the other, I could not accept this reason. My own opinion is that it was caused by a strain being set up in the bend tself, owing to the shrinkage of the metal in casting.

Turning to the distribution, we have two trunk mains leading into the town of Torquay, from which various branches are taken off *en route*. Torquay is, as many of you know, a very up-and-down sort of a town; and may be said to be built on five hills. The levels range from 13 feet to 448 feet above Ordnance datum; and as the works stand at about 50 feet above the datum line, we have a good range of varying altitudes to supply. The greater part of the town is laid out with villa residences, with usually a large garden attached to them; and though we have about 46 miles of mains, the number of consumers per mile of main is very low—being according to our last returns 58. This number will in the present year be increased owing to the growth of the prepayment system. No effort has hitherto been made to reduce the pressure on the hills—which at some parts of the day is excessive—beyond the laying of small sized main-pipes; and for many reasons the question of districting is one that will have to be approached with considerable caution. Nearly all the houses have been fitted with very small pipes—$\frac{1}{4}$ inch for the most part—and the moment the pressure falls below 25-10ths, the office is filled with complaints of no gas, bad light, &c. Just as I write a typical case has been brought to my notice. The pressure at the back of the house was 16-10ths, and in the front only 4-10ths; and the moment you explain this to the consumer, the answer comes: "Oh, if I have to pull my house to pieces, I may just as well put in the electric light." Still, something will have to be done to reduce the unaccounted-for gas, which at present stands at the high figure of 10 per cent., though that this is all leakage is not I think the case. Condensation plays an important part, also the difference in temperature, and last, but not least, the public lighting, which is carried out by the Corporation on the average meter system. However, this year I look forward to trying in a small way the effects of regulating the pressure by means of district governors, and hope at some future date to lay the results of the experiment before you.

The consumption per consumer, disregarding the amount used for public lighting, is fairly high—working out to about 43,000 cubic feet; whereas in 1879, the amount was only 33,000 cubic feet. This, of course, shows that our efforts to increase the consumption by reducing the price of gas, and by the letting out of cooking and heating stoves, have met with a fair share of success; but though one must not grumble at an increase, however obtained, I would far rather have found that the amount per consumer was stationary, and the rise accounted for by a larger number of consumers.

We have now introduced the prepayment system, which promises to rectify this. We have just completed one year's working, during which time we have fixed over 400 meters; giving the consumers gas at the rate of 20 cubic feet for a penny, and supplying one pendant, one bracket, and a boiling ring, and, of course, doing all the fitting. This latter is let to a local gas-fitter, at the rate of 16s. 6d. per house; he finding all materials, from the stopcock, excepting the fittings above mentioned. We find that the average cost of fitting up the houses works out to £5 7s.; and as the excess price is 1s. 2d. per 1000 cubic feet, I hope to show my Directors that this new field for extension is one worth cultivating. The average consumption per house works out at about 9000 cubic feet; but this is probably a low estimate, on account of the larger number of meters having been fixed towards the end of the year. We have had few difficulties in our way. The most general has been the inclination of the meter to let people have too much gas for their money; and though they had signed an agreement to pay for any excess of gas used, it was astonishing to find the number of consumers who said they had never read or understood that condition. This has been rectified now, and the last report is more satisfactory; only three or four having been discovered slow, and these only to a slight degree. We found it much better to pass over these relapses in silence, as, the system being on trial in our neighbourhood, it would not have done us any good to allow the consumers (who, generally speaking, are not slow to let the world know of their fancied wrongs) to air this grievance.

Torquay has, like many other towns, been bitten with the craze for electric lighting; and I hoped to have been able to give the meeting some of the results of the enterprise. The Order was obtained some six years ago; but from one cause and another no start was made until the beginning of last year. Everything was to have been ready by about the end of September. Owing, however, to the disastrous strike of the engineers, the works are not yet in order, so that I can only give you a few particulars of the machinery employed, and not as to how far it has affected the consumption of gas. The machinery is placed in some stores belonging to the Corporation adjoining the new harbour. It consists of three Babcock and Willcox boilers, each 150-horse power, and one Green's economizer. There are three sets of Willan and Robinson's 3-crank compound engines, each working up to about 250 indicated horse power, driving alternators made by Easton and Anderson; three rectifiers for the current supplied to the arc lamps, made by Ferranti, by whom also the switch-board is manufactured; and the usual feed and circulating pumps for the condenser, for which sea water is to be used. About $3\frac{1}{2}$ miles of cable have been laid in the main roads and streets; and the Corporation have erected 57 arc lamps to light the streets. How many gas-lamps are going to be displaced is not yet settled; but there is one instructive fact in connection with these. The price fixed by the Electric Light Committee to be charged for the arc lamps is £25 per annum each—or a total of £1425. The present amount the Corporation pay us for the gas supplied to 820 lamps is £1487 per annum; so that in future we may expect the lighting bill for Torquay to be a fairly heavy one. As an example of what can be accomplished by gas, we have had a Denayrouze light fixed outside our offices; and we do not think we shall suffer much from comparison.

In common with many other towns, we suffer very much at times from naphthalene; and I have tried many remedies, all of which have been recommended me as certain cures of this evil, but alas with no diminution in the number of complaints. This past year we certainly have had fewer complaints, but I cannot pretend that this is owing to any new method of working, but rather to the fact that the extremes of the night and day temperatures have been very much less than usual. M. Brèmond and Mr. Botley have shown us how to free our services from this pest; but we want to go further than this, and find how to keep this hydrocarbon from being thrown down and carried into the tar-well. It is a difficult problem, but at the same time an exceedingly interesting one; and no doubt a rich reward awaits the man who can solve it satisfactorily.

The residuals market, with the exception of tar, appears to be in a decidedly more healthy condition at the present time; and the wish of "Long may it last," will no doubt be re-echoed by all here. The mountains of coke that blocked our yards, and the heavy stocks of sulphate, have disappeared. The extended use of water gas will no doubt tend to prevent coke from becoming a drug in the market; while one hopes that the new Association of Sulphate Producers will help us to keep this article at a more regular price, and, by removing the prejudices that exist in the minds of our agriculturists against the use of this valuable fertilizer, extend its use considerably in this country. With regard to tar, matters do not seem quite so hopeful. There is one way by which some of the surplus tar might be used up, and that is by the use of tarred macadam for road

making purposes. Our Borough Engineer (Mr. H. A. Garrett, Assoc.M.Inst.C.E.) is now laying some down as an experiment, and so far the results have been very satisfactory.

And now I turn to a very different and complicated matter; but it is one that is forcing itself more and more on the attention of gas companies. I refer to the action of the rating authorities in attempting to raise the rateable value of gas property in a most unfair degree; and though, of course, in the end the consumer has to pay, it is not by any means a proper policy to adopt, especially now as many of the public bodies are supplying the electric light in opposition to us. I had hoped to have collected some statistics on this question, and to have laid them before you to-day; but time has prevented my so doing, and therefore my remarks must be mainly confined to our own experience. My Company have three parishes to deal with; the major portion of the works being situated in Paignton, which is supplied by a separate Company. The minor portion, together with about 7 miles of mains, is in Cockington; and only the offices and mains are in the parish of Tormoham or Torquay. For many years we have been paying the lion's share to Torquay; and as the other parishes seemed content, and the total rateable value was a fair one, it was not our duty to make a disturbance, and say how it should be apportioned. But at the last Quinquennial Valuation, all three parishes demanded an increase. Paignton and Cockington we felt were to a certain extent justified in their demands; and after an interview with the Assistant Overseers, we settled the matter in an amicable manner. In Tormoham, the reverse was the case; and we felt we could no longer yield to their voracious appetite. Accordingly we consulted an expert in the matter; and after his report had been received, we went before the Guardians, and presented our case. They, in turn, called in another expert to go through our works and accounts; and after a long delay, his report was presented. The figures were as follows, for the Tormoham parish only: Our expert £875. Guardians' expert £1950! Guardians' demand £2900!! After a further period of waiting, and much correspondence, rather than carry the case into Court, the matter was compromised by our accepting the sum of £1750 as the rateable value. Taking the experts' reports, just look at the difference that exists between them. Surely I am right in saying that it should not be possible for any two men to differ so much in fixing the rateable value of any works, especially as they both accepted our valuation of the works, mains, and stocks as being a fair one. Calculating the amount of the tenants' capital seems to me to be the rock on which so much of the dissension is founded; and I, for one, think that it is high time the Legislature stepped in and laid down rules of procedure, by which this rock could be made a surer foundation. We most of us have, at one time or another, had to undergo the hard work and anxiety entailed by these vexatious demands; and I hold that the gas interest should unite and force this matter on the attention of those who make the laws, until they step in and take this matter up, and so prevent an enormous amount of public money being absolutely wasted.

In concluding this address, there is one other subject on which I should like to say a few words. I have been very much struck with our last President's able pleading for the establishment of a gas-works for the purpose of experimenting and reasoning out the laws which govern the economical production of coal gas; and I cannot help wishing that such a realization of his views were likely to take place, for it would, I firmly believe, be of inestimable advantage to the profession to have such a works established. However, his plea, as far as I am aware, has been received with silence. I now, with all due deference, venture to make a suggestion; and I do not see any great difficulty to prevent it being carried out. Now there must be a large number of works the managers of which have neither the time, means, nor apparatus to carry out any experiments necessary for the reasoning out of the phenomena which often occur; and especially is this true when it comes to making analyses. The scheme, therefore, that I venture to offer for your consideration is briefly this: That the Institutes (I hope one day we shall again be able to say the Institute) should appoint a chemist whose duty would be to test samples of any materials that might be sent him, and generally to collect and classify data of the many difficulties and odd circumstances that are continually cropping up in any works. He should also be allowed to travel to any works requiring his assistance or advice. Now, of course, I do not mean that this should be done free of expense to the gas company or authority. A fee according to the distance and time required should be charged to recoup the Institutes for the outlay; and the information obtained should only be open to members. By this means, I think our leading bodies would be capable of doing a large amount of useful work, and of spreading much important information among the profession. Take, for example, the work just accomplished by a Sub-Committee of the Incorporated Institution of Gas Engineers in their report on a proposed ten-candle standard. Who will deny the importance of this report, and who does not thank the members for having given so much valuable time and thought to carrying out the necessary experiments? The work that these gentlemen have done so well should, I say, be carried on by paid assistants, under the direction of the Councils of the Institutes, on the lines sketched above.

Mr. W. D. CHILD (Romford) asked the members to join with him in a cordial vote of thanks to the President for his interesting address. He was sure the members of both the Southern and South-West Associations looked forward to some advantages being derived from the amalgamation of the two organizations; and in securing Mr. Beynon from the South-West Association, the Southern members at all events might feel, with some satisfaction, that good had arisen from the combination of the two bodies. Mr. Beynon had successfully passed through the ordeal that was experienced by all Presidents of Associations in preparing an address—that was, the difficulty of finding new matter to present to the members; and he hoped his year of office would be a pleasant and beneficial one.

Mr. NORTON H. HUMPHRYS (Salisbury) asked to be allowed to second this vote of thanks. As the late Secretary of the South-West Association, he might say that in the days of that Association they looked to Mr. Beynon as a very great help in giving them practical information. They had a marked example of the ability with which he could do so in the address which they had heard read. It contained a great deal of useful information, and gave them much to think about. As one who took a prominent part in the proceedings which led up to the amalgamation of the Southern and South-West Associations, he (Mr. Humphrys) was very pleased to hear the expressions that had fallen as to the success of that amalgamation, and to learn that the first year's work under the changed conditions had been such as met with the approval of the Committee.

The motion was carried by acclamation.

A brief acknowledgment by the PRESIDENT closed the business.

The members subsequently dined together; spending, as usual, a most enjoyable evening.

BRITISH ASSOCIATION OF WATER-WORKS ENGINEERS.

A General Meeting of the above Association was held last Saturday, at the Westminster Palace Hotel—Mr. H. ASHTON HILL, M.Inst.C.E., presiding.

The PRESIDENT having welcomed the members,

The SECRETARY (Mr. W. H. Brothers) read the minutes of the annual meeting held at the Westminster Town Hall in July last; and they were confirmed.

ELECTION OF MEMBERS AND ASSOCIATES.

The ballot-papers for the election of new members and associates were next examined by the Scrutineers, Messrs. C. SAINTY and W. MILLHOUSE; and they reported that the following gentlemen had been admitted to the Association:—

Members: Barham, H. G. F., of Jersey; Callon, R., of Aylesbury; Diggle, J., of Heywood; Greenslade, G., of the South Hants Water Company; Hammond, F., of Chepstow; Harvey, J. F., of Ryde; Jones, C., of Teignmouth; Kemna, Dr., of Antwerp; Nash, W. J., of Guernsey; Nichols, H. B., of Birmingham; Prouse, O. M., of Ilfracombe; Secker, E. O., of Slough; Smith-Saville, R. W., of Darwen; Turner, H., of Folkestone; Wood, A. P., of Shanghai.

Associates: Adams, H. C., of Evesham; Askwith, J. E., of Consett; Blackburn, A. B. E., of the South Staffordshire Water Company; Bowser, C. A., of Glasgow; Chalk, J., of Southampton; Douglass, A. E., of the South Staffordshire Water Company; Drayson, W. W. H., of London; Goldsworthy, W., of the Southwark and Vauxhall Water Company; M'Pherson, J. A., of Bristol; Moore, N. S., of Sheffield; Peters, N. J., of Southampton; Saville, C. M., of Boston, Mass.; Scott, J., of Edinburgh; Watts, W., jun., of Sheffield.

THE FORMATION OF WATER BOARDS.

The PRESIDENT stated that the Committee who were appointed to consider the question of the formation of Water Boards had passed the following resolution: "That this Committee is of opinion that the establishment of Joint Water Boards is desirable, and that members of the Association should use their best endeavours in this direction." He thought perhaps it would be desirable that the members should pass a resolution endorsing this one. The Committee met some time ago, and discussed the question at great length. It was felt that they could not take a more ambitious course at present than to do as the resolution implied—that was, to co-operate with others. The Committee found that the Association were not the first in the field, and that the question had been considered by various other bodies for some time past. Certain legislation bearing on the subject already existed—such as the 1876 Rivers Pollution Act. But it was considered generally to be incomplete; and further legislation was absolutely necessary before much could be effected in the direction referred to. Since their establishment, the County Councils had taken up the subject of river pollution; and this question seemed to him to be one of the main arguments in favour of the constitution of Water Boards. It was astonishing to see how the idea of forming such Boards was moving; but whether it would become an Imperial question in the near future, one could not tell—probably it would.

Mr. F. J. BANCROFT (Hull) moved that the resolution of the Committee be confirmed. In his opinion, however, it hardly went far enough. He thought the President had "hit the nail on the head" in saying that this was an Imperial question. Not only should Joint Water Boards be formed all over England, but a special department of the Local Government Board, or some other authority, should be appointed to deal solely with the subject. At the present time, it was simply a

scramble for water. Those who asked for most, hoped to get most, or anyway hoped to put themselves in a good position, regardless of the wants of other districts.

Mr. F. GRIFFITH (Leicester), in seconding the motion, spoke of the contamination of water supplies by the distribution over drainage areas of pan manure from neighbouring towns, and of the necessity of preventing this.

Mr. W. MATTHEWS (Southampton), one of the members of the Committee, said they would have been very glad if they could have brought forward some more specific recommendation. The reason why they only proposed at present that the matter should be left to the individual efforts of the members was that they felt, the Association being a new one, any representation that might have been made to the Local Government Board would not perhaps have received the consideration they would have liked. When they became rather more influential, they might approach the Board on the subject.

The motion was unanimously carried.

ANNUAL MEETING.

The PRESIDENT announced that the annual meeting would be held at Southampton during the third week of May.

SPRINGS AND WELLS FOR TOWN SUPPLIES.

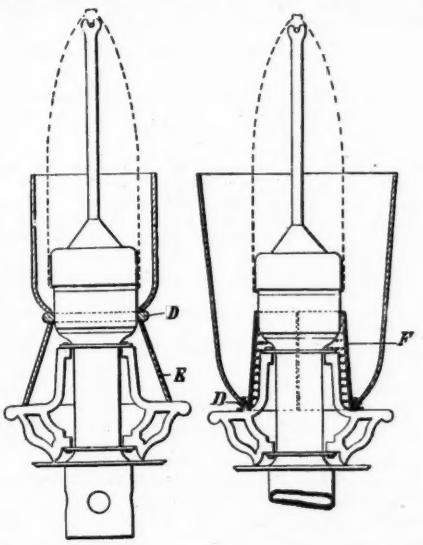
Mr. H. W. PEARSON (Bristol) read a paper on the above subject; and it was very fully discussed. The principal parts of the paper, with a summary of the discussion, will be published in an early issue.

A vote of thanks to the author of the paper concluded the proceedings.

REGISTER OF PATENTS.

Incandescent Gas-Burners.—Reed, F. J. P., of Plymouth, Spearman, W. T., of Yelverton, and Wright, W., of Plymouth. No. 2983; Feb. 4, 1897.

According to this invention, the burner is provided with a dwarf chimney, as a draught protector for the mantle—formed as shown in two different ways.



The ordinary type of burner, with its mantle contained within a dwarf chimney, is provided with a metal ring D, not only to support the chimney, but to exclude draughts from, and otherwise protect, the mantle within it. E is a tapered supporting tube, which can be placed on the gallery-arms to support the rings D. In the right-hand figure, the ring D is made of such size as to encircle a cone F, and serve to close the annular passage-way between the lower end of the chimney and the adjacent part of the burner. The cone F and ring D are both supported by arms, and may be notched to engage them if desired. By either of the arrangements shown, currents of air entering the annular opening at the base of the burner are prevented from impinging on the mantle. The cone F can be divided down one side as shown by the right-hand figure, to facilitate the putting of it into place by springing it over the head of the burner.

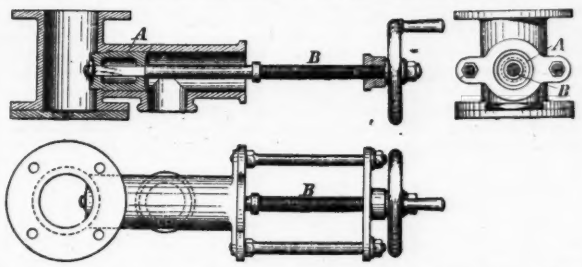
Gas and other Explosion Engines.—Caley, E. C., and Stephenson, W. W., of Burstwick, near Hull. No. 4528; Feb. 19, 1897.

The object of this invention is to employ the power usually expended in compressing the charge in gas or other explosion engine cylinders, so as to give the power out, and assist the piston on its stroke, also "to give greater expansion, and therefore to obtain a higher mean pressure, and to obtain an equivalent compression of the charge, whether it is a light, heavy, or intermittent load, and, by getting a higher compression, to have a proportionately high explosion." For this purpose, there is placed within the working cylinder of the engine a supplementary piston, preferably connected to a rod having a spring thereon, and working within the working cylinder—a space being left between it and the working piston. The spring is made of strength suitable to stand any desired pressure. As the charge is drawn in, it is compressed between the working piston and the supplementary piston; the spring being also compressed. When the working piston makes the stroke, the supplementary piston helps it; the spring expanding on being released, and forcing the supplementary piston towards the working piston, which gives out the power usually expended by compression, and thus helps the working piston in its stroke.

Valves for Self-Discharging Sulphate Saturators.—Howell, H., of Donnington, near Newport, Salop. No. 4095; Feb. 15, 1897.

This invention has for its object to provide a valve for use in self-discharging sulphate of ammonia saturators which "will maintain the passage in which it works clear of incrustation, or collection of matter tending to clog it."

Fig. 1 is an elevation; fig. 2, a transverse section; and fig. 3, a longitudinal section of the valve. It consists of a casing with an opening into which leads the outlet from the saturator, and another opening constituting the outlet from the valve. In the casing is mounted a piston or



plug A, constituting the valve proper, and capable of being moved backwards and forwards in the casing, so as to put the openings in communication with each other, or close the communication between them. The movement of the piston can be effected by a screw B, provided with a hand-wheel, and working in a nut fixed to the casing by rods; the screw being connected to the piston so as to be capable of being turned by a squared connection, so that the rotation of the screw rotates the piston. The piston is provided with sharp edges, which will cut away or scrape off deposited matter, when it is moved to or fro in the casing.

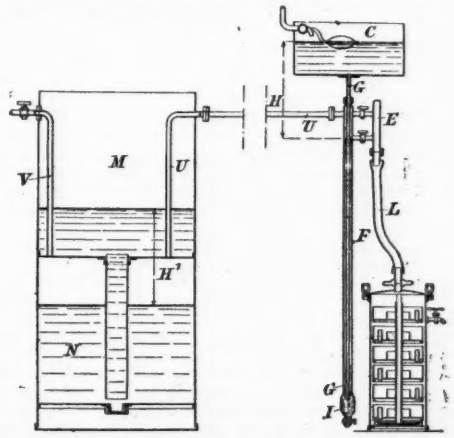
Explosion Engines.—Ollivier, A., of Paris. No. 4580; Feb. 19, 1897.

This invention relates to various kinematic arrangements, by which the working effects transmitted by the pistons to the cranks of gas-motors, and, speaking generally, any motors worked by an explosive mixture, can be equipoised. These arrangements are divided into two principal groups: The characteristic feature of the first consists in the use of toothed crank-discs or wheels, and in the use of multiple shafts; while the characteristic feature of the second is the capability of the cylinder and of the piston to move simultaneously. The details of the invention are not described apart from the series of figures (21 in all) by which the specification is accompanied.

Acetylene Gas-Producer.—Lacroix, P. A. M., of Toulouse, France. No. 4761; Feb. 22, 1897.

The generator is composed of a water-tank C, which constantly supplies a syphon formed as follows: A tube G of small diameter coming from the water-tank runs down into the lower part of a tube E of larger diameter. The two tubes communicate with one another through the medium of the chamber I. The tube F communicates with the generator by cocks on the collector E, and the flexible tube L. The upper cock, which is larger than the lower one, is intended for the passage of the gas. The generator is closed with a hermetical cover, in which is arranged a central pipe, to which the tube L is connected. A series of baskets or trays mounted one above the other are placed in the generator on horizontal brackets on a central shaft. Each basket consists of a wide shallow tray without cover, and perforated in the centre with an opening furnished with a pipe of greater height than that of the tray, as well as with one or more pipes for the passage of water from the upper tray into that immediately below.

When in operation, the water runs down from the reservoir C into the

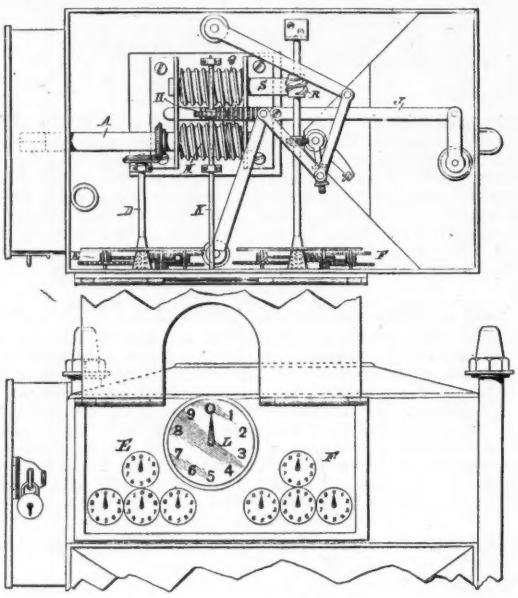


filtering chamber I, through the tube G, and up again between the two tubes. Having reached the height of the lower cock, it runs off into the generator, passing through the cock and tube L. Gas is immediately generated, ascends through the tube L, and passes through the collector E and tube U, and enters the lower compartment N of the holder, and forces the water into the upper compartment M. After a time the column

H^1 in the holder becomes equal to the column H in the generator; and thereafter the gas automatically regulates its own production. In point of fact, if H^1 be increased, H will be increased in the same ratio, which results in a compression of the water below the orifice in the lower cock, and stoppage of the flow of water into the generator, arresting thereby the generation of gas. An inverse effect is produced if, by withdrawing gas by the tube V, the column H^1 is diminished in the holder, H will also be diminished until the water-level in the tube F reaches the level of the lower cock, which consequently admits a fresh supply of water to the generator, and thereby generates a fresh supply of gas. This combination of generator and holder, says the patentee, constitutes "a real hydraulic lever, not hitherto brought into use;" and this forms his principal claim.

Recording the Rotations of Coin-Actuated Mechanism.—Glover, R. T. & J. G., of St. John Street, Clerkenwell, E.C. No. 6344; March 10, 1897.

The patentees propose to so operate the registering apparatus directly from part of the coin-actuated mechanism that has a continuous forward rotation in one direction, and entirely independent of and uncontrolled by the meter mechanism, as to permanently indicate on a system of dials the proportionate movement imparted to the coin-actuated mechanism, and consequently the amount of gas prepaid for each consecutive insertion of a coin, as well as the sum total for a given period whether consumed or unconsumed.



The engraving shows (at top) a plan of a gas-meter with the cover removed, and exposing the valve-operating mechanism, and the co-operated mechanism or appliances with dial for recording the number of coins inserted; also a dial for indicating the quantity of gas paid for or sum total of the coins received, and consequently the quantity of unconsumed gas. The lower part is a face view of the dials.

The patentees adopt the "two parallel screws" arrangement (described in patent No. 22,830 of 1894), on the axle A of which is fixed a bevel-wheel, in gear with a pinion on a unit dial-spindle D, the gear of which is in connection with other dials of the series E for recording the quantity of gas paid for, and also the sum total of the coins received by the apparatus. The series of gear F is the usual index-indicator of a gas-meter, and is operated by the meter mechanism in the well-known manner. H is a pinion, in gear with a rack of the valve-opening draw-rod J. The spindle K of the pinion H has the finger of the dial L affixed to it; the dial being covered by a glass disc, so as to be always visible, while the other dials E F are covered by a flap-shutter, shown open in the lower part of the engraving.

The operation of the meter is as follows: On the insertion of a coin into a price-changer such as that described in patent No. 25,272 of 1894, the spindle A is turned the requisite part of a revolution; the spindle in its rotatory movement carrying the finger of the unit dial E, to record the sum total of the coins received by the apparatus. The spindle has a screw-barrel N on it; and this causes a pinion to rotate, and make it travel along the screw-threads of the other barrel Q without imparting motion to it. The turning of the spindle A, however, and its screw-barrel N, by giving motion to the horizontal pinion, causes the valve-rod J to travel and open the gas-valve more and more; and while the coins are being inserted in succession, they are carried round in the price-changer for delivery by coming into contact with a fixed stop. The travel of the valve-operating rod J, and the pinion H in gear, causes the finger of the dial L to move round, so as to indicate the number of coins inserted.

Now suppose a consumer has inserted nine successive coins, the visible dial L would show it; so when the gas is turned on, and the gas-valve is open, the gas would flow through the meter, and in doing so the worm R would rotate the spindle S and also the barrel Q—the barrel N remaining stationary. The barrel Q, by its screw thread, now causes the horizontal pinion to rotate in the reverse direction, and in doing so to travel along the stationary barrel N, and draw back its rod J, the rack of which reverses the direction of rotation so as to gradually act for closing the valve. The pinion H also has a reverse rotation; and consequently it takes the finger of the dial L towards the numeral eight, thereby showing a consumption to the value of one of the coins inserted. Thus as each coin's value of gas is consumed, the dial L indicates how much more gas is unconsumed. But the consumption goes on until the gas representing the full value of the inserted coins is used up, and the finger of the dial L then goes back to zero—the gas-valve being closed to await the insertion of a fresh coin and the operation of the spindle A to reopen it.

The dials of the series E indicate the sum total of the coins received during a given period—say, monthly or quarterly; and on the visit of an inspector, who alone can examine the dial, he would enter in his book the record there shown, as representing the total of the coins received. He would then return all the fingers of the dial series E to zero. By this system of registering, say the patentees, a comparison for error can be made between the mechanically-operated index and the ordinary index actuated by the meter mechanism.

Liquid Meter.—Empain, E., and Glibert, J., of Brussels. No. 16,070; July 6, 1897.

This meter consists of two parts—the upper part being provided with a moveable box containing the counting mechanism, while the lower part is furnished with two screw-threaded water inlet and outlet pipes respectively. The inlet-pipe contains a wire gauze cap, which prevents any matter existing in the water from entering the meter. The outlet-pipe is furnished with a small back-pressure valve, so as to prevent water from entering. Two auxiliary valves (one of which allows the water to run out, while the other serves for the entrance of water) operate in unison; the characteristic feature of their construction being that one valve-seat is placed outside, while the other is inside. The two valves are actuated by toggles, connected to weighted levers held in position (and under constant tension) by springs, and by two larger toggles held in position by the large levers controlled by other springs. Bellows, provided with a number of copper rings, are fixed at their lower end to the main seat of the valve gear, and at their upper end to the cover or lid, which carries a disc or catch for actuating the wheel-work after each double oscillation. In the centre part of the lid or cover is arranged a hollow rod, carrying at its lower extremity a stop; and outside the rod is arranged a tubular stop-piece, provided with a nut, and used to regulate the apparatus.

APPLICATIONS FOR LETTERS PATENT.

2436.—Clayton, S., and Mensforth, H., "Lubricating gas and oil engines." Jan. 31.
2444.—Yeadon, A. E. N. & S. N., "Purification of gas." Jan. 31.
2449.—Hayward, F. W., "Pipes for conveying water." Jan. 31.
2452.—Thorp, T., "Apparatus for mixing gases." Jan. 31.
2453.—Thorp, T., "Gas conduits." Jan. 31.
2454.—Thorp, T., "Production of Acetylene." Jan. 31.
2463.—Dougill, J., jun., "Gas and oil motor engines." Jan. 31.
2528.—Beal, W., "Globes for gas and other lights." Feb. 1.
2582.—Johnson, J. Y., "Lamp for generating and burning acetylene." A communication from La Compagnie Lyonnaise du Gaz Acetylene. Feb. 1.
2592.—Favaretto, E., "Production of acetylene gas." A communication from V. Favaretto. Feb. 1.
2599.—Boecking, R., "Cooling device for the discharge mains or pipes of ovens or gas producing apparatus, through which the gases are led off for the condensation of tar, ammonia, benzol, &c., therefrom, and for use as illuminant, fuel, and the like." Feb. 1.
2601.—Lucy, A. J., "Production of acetylene gas." Feb. 1.
2602.—Marcks, H. O., "Generating acetylene." Feb. 1.
2615.—Himmel, G., "Bunsen burners for incandescent lighting." Feb. 1.
2634.—Heath, G., "Railway platform, street, and other lamps." Feb. 1.
2643.—Sellen, D. C., "Automatic water supply cistern, for use with coins." Feb. 2.
2644.—Robinson, H. L., and Bishop, H. S., "Strengthening incandescent gas-light mantles." Feb. 2.
2647.—Swinburn, W. R. & W., "Improvements in cocks, taps, and valves of every description." Feb. 2.
2662.—Nashmith, J., and Mercer, A., "Coin-freed gas-meters." Feb. 2.
2716.—M'Clurg, W. J., and The M'Clurg Gas Construction Company, "Gas-generators." Feb. 2.
2728.—Blackwood, R. S., "Internal combustion engines." A communication from G. H. Rogers. Feb. 2.
2741.—Adams, R. B., "Mechanical means for (and mode of) burning off incandescent gas-mantles." Feb. 3.
2750.—Beechey, C. G., and Wright, A. T., "Automatic gas and other meters." Feb. 3.
2755.—Bapst, G., and Grelet, A., "Petroleum or gas engine." Feb. 3.
2780.—Ryland, H. S., and Townley, A. N., "Acetylene gas generator." Feb. 3.
2797.—Winstanley, G., "Regenerator settings of retorts for the manufacture of coal gas." Feb. 3.
2802.—Thompson, W. P., "Generating and burning acetylene gas." A communication from E. Charpentier. Feb. 3.
2810.—Chenard, E. C. M., "Internal combustion engines." Feb. 3.
2811.—White, C. & T. H., "Flash-lights for incandescent and other burners." Feb. 3.
2839.—Wyeth, R. H., "Acetylene and other similar gas-lamps." Feb. 4.
2863.—Ferguson, J. S, "Acetylene gas generator." Feb. 4.
2914.—Wasdell, T., "Gas or other engines." Feb. 5.
2952.—Beal, W., "Globes and shades for gas and other lights" Feb. 5.
2962.—Fraser, P., and Macdonald, J. R., "Argand and other burners for gas or oil." Feb. 5.
2982.—White, C. M., "Protecting the mantles of incandescent gas or oil burners upon the placing in position or removal of the chimneys." A communication from N. Gadowski. Feb. 5.
2997.—Gearing, E., "Preparation of calcic and other gas-producing carbides." Feb. 5.
3004.—Momand, R., "Gas-burners." Feb. 5.

The Drogheda Corporation and the Gas-Works.—At the meeting of the Drogheda Corporation on the 2nd inst., it was decided to offer the Gas Company £21,000 for their undertaking; and in the event of the acceptance of this amount, the Gas Committee were empowered to negotiate for the purchase.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Use of Breeze as Boiler Fuel.

SIR,—My attention has been drawn to a letter appearing in your issue for the 18th ult., asking for the experience of users of breeze as boiler fuel. The special information your inquirer desires is whether the steel plates of boilers are injuriously affected by the steam admitted under the fire-grate. As the first user of the Meldrum furnace, I may be permitted to say that for ten years I have employed it in connection with steel boilers, and that no deterioration of the flues has occurred. It is highly desirable that all poor fuels should be utilized, and that no misunderstanding as to the efficiency of the furnace should hinder this. Your correspondent need have no hesitation in adopting this economical and convenient apparatus wherever small cheap fuel is available. The experiments recorded in your issue of the 11th ult. (p. 78), while confirming the advantages of the system, show also the need of great improvement in the furnace used before the efficiency of English practice is attained.

Halifax, Feb. 10, 1898. T. HOLGATE.

Dust Destructors and Electric Lighting.

SIR,—Your straightforward comment in last week's "JOURNAL" upon the present system of "booming" in connection with destructors must commend itself to every thoughtful engineer, whether gas or electric. Certainly no language can be too strong in condemnation of the so-called "Press views"—in other words, "big feeds," with wine *ad libitum*. Whether or not this sort of thing pays the contractor it is difficult to say. Doubtless some few councils are led to look with favour upon schemes written up under such influence, and in connection with the "big name" now ordinarily hooked on; but it is not healthy.

I note that you mention Mr. Charles Jones, of Ealing; and my object in thus trespassing upon your space is to give you an extract from the preface to his book upon "Refuse Destructors," dated November, 1893. Mr. Jones says:

During the past few months, much has been written relative to the value of the destructor as an agent for the production of electric energy. Now, although the author does not dispute the fact that there is a certain value which should be utilized, it would be worse than folly to go in opposition to the ascertained facts, which have a practical bearing upon the subject. By all means utilize to the fullest extent all that can be got out of house refuse. But if some of the theories propounded are taken as the basis upon which hopes are to be raised and thousands of pounds expended in the attempt to light large towns with the product of the dustbin, then, without a doubt, failure will follow the experiment, and then too late corporations will learn that an electric installation, while utilizing to the utmost all that can be obtained from the destructor, must be absolutely independent of the same, and rely entirely upon its own completeness, even to the smallest detail.

These words certainly form an addendum to the remarks in your "Electric Lighting Memoranda" last week.

Feb. 11, 1898. COMMON SENSE.

Flueless Gas-Stoves.

SIR,—The faults which have been claimed for flueless gas-stoves are numerous; and the last new one has been discovered by an "expert" and architect, who has been called in to certify that the dampness of a house is caused by the water of combustion evolved by such stoves. If an expert cannot prove beyond question anything he is paid to prove, he is certainly not an expert. Now, the amount of gas used for warming the room is about the same as would be required to light it, if the burners were placed in a proper position; and if the expert's opinion is correct, the use of gas for lighting should also be discontinued, although flueless gas-stoves have been in use for years to keep large organs dry in public buildings. One curious thing in connection with this is that the amount of moisture formed by a gas-burner consuming 4 cubic feet per hour is precisely the same as that given off by the lungs and skin of an average healthy person —*i.e.*, 60 ozs., or 3 pints, in 24 hours. If this expert is correct as regards the cause of dampness in a house, how much greater the trouble must be with the large amount of moisture exhaled by the residents. Figures can be made to prove anything. An average healthy person, if in bed for eight hours, will lose one pint, or 20 ozs., of water through the skin and lungs. A pint of water in bed every night ought to be a serious matter; and yet we survive, and our lives are longer than those of our ancestors, in spite of microbes, flueless gas-stoves, and beds which ought to be damp. The expert will perhaps try to prove next that sleeping in bed is the reason why so many people die there.

Warrington, Feb. 9, 1898. THOS. FLETCHER, F.C.S.

Dustbin Refuse as Fuel.

SIR,—In your issue of the 25th ult. appeared an article, the subject of which is: "Is Dustbin Refuse a Fuel," in which the author—Mr. N. H. Humphrys—after an examination of the destructor which has been so much "boomed" of late, comes to the conclusion that dustbin refuse has practically no potential energy beyond the heat necessary for its own destruction (incineration). His argument that, because garbage and ashbin refuse will not burn in a "bonfire" or in the copper fire, therefore there is no fuel value in it, will appear to be weak to all modern students who have even a slight knowledge of the facts, as it is self-evident that what may and will burn under favourable conditions, and with a suitable draught, in a reverberatory furnace, it may be found quite impossible to burn when these favourable conditions are absent.

If Mr. Humphrys will make inquiry of the Surveyor of Hereford, of York, or of Basingstoke, he will find that dustbin refuse is being, and has been in some cases for a long time past, used as fuel. In the first-named town I understand that, whereas previously it cost the ratepayers about £300 per annum for fuel for the sewage-pumping station, no fuel of any kind other than housebin refuse, is at present, or is intended in future to be used, and that considerably more than 1 lb. of steam per pound of this refuse is being constantly obtained.

Because Salisbury has tried and failed, it does not follow that the refuse is at fault. If investigated, it would probably be found that the destructor itself is not of a design calculated to make it successful as a steam raiser. The Authorities at Salisbury might do worse than run over to Winchester, and see how a destructor may, at a small cost, be made to do double duty and raise a large volume of steam. The writer will be glad to supply Mr. Humphrys with demonstrative proofs that in many cases house refuse is being constantly used for steam-raising purposes, and evaporating from 1½ to nearly 2 lbs. of steam per pound of unscreened refuse put into the furnace.

That it is possible to spend more on the plant than is justified by the low calorific value, I am quite aware; and my fear is that this will prove to be the case in the London parish which has been so often before the public of late. But it is possible, and has been demonstrated once and again, that with an efficient and inexpensive plant, not too much encumbered with hydraulic and electric lifts, self-charging apparatus, thermal storages, &c., the "game" is very well "worth the candle," and the cost of an installation may be repaid to the ratepayers within a very few years. At Hereford I understand it is calculated that within four years the total cost of the installation, including structural alterations to the building and the equipment of the destructor cells, will be repaid. Surely, then, if these statements can be verified—and it is in Mr. Humphrys' power to verify them—dustbin refuse is, after all, not to be despised as a fuel.

Feb. 5, 1898. VERITAS.

PARLIAMENTARY INTELLIGENCE.

PRIVATE BILLS (SESSION 1898).

The Fourth Session of the Fourteenth Parliament of Her Majesty the Queen was opened by Commission last Tuesday. Among the earliest proceedings was the usual conference between the Chairman of Committees of the House of Lords (the Earl of Morley) and the Chairman of Ways and Means of the House of Commons (Mr. J. W. Lowther), for the purpose of determining in which House the respective Private Bills should be first considered. It was decided that the following Bills in which our readers are interested were to originate in the Upper House:—

Aberystwith Gas Bill, Bacup Corporation Water Bill, Bakewell Gas Bill, Blackpool Improvement Bill, Bury Corporation Bill, Carlisle Corporation Water Bill, Edinburgh and District Water Bill, Edinburgh and Leith Corporations Gas Bill, Felixstowe and Walton Water Bill, Filey Water and Gas Bill, Folkestone Corporation Water (Transfer) Bill, Folkestone Gas Bill, Folkestone Water Bill, Forres Water Bill, Halifax Corporation Bill, Hamilton Water Bill, Heywood Corporation Water Bill, Kettering Water Bill, Market Harborough Gas Bill, Morley Corporation (Gas) Bill, Morley Gas Bill, Newcastle and Gateshead Water Bill, Newhaven and Seaford Water Bill, Newhaven and Seaford Water Board Bill, Newtown Water Bill, Redhill and Reigate Gas Bill, Reigate Gas Bill, Rochdale Corporation Water Bill, Sheringham Gas and Water Bill, Stirling Gas Bill, Swansea Gas Bill, Todmorden Corporation Water Bill, Todmorden Corporation (Water Transfer) Bill, Tynemouth Corporation Water Bill, Waterford City Gas Bill, Wath-upon-Dearne Urban District Council Bill, Yeovil Corporation Bill, Yeovil Gas Bill.

The following Bills were to originate in the Lower House:—

Brompton, &c., Water Bill, Carmarthen Improvement Bill, Clacton-on-Sea Gas and Water Bill, Coventry Corporation Gas Bill, Cranbrook District Water Bill, Crawley and District Water Bill, Cromer Gas Bill, Drogheda Gas Bill, East Ham Improvement Bill, Enfield Gas Bill, Frodingham Gas Bill, Gaslight and Coke Company Bill, Gloucester Gas Bill, Hartlepool Gas and Water Bill, Haslemere District Water and Gas Bill, Higham and Hundred of Hoo Water Bill, Ilford Improvement Bill, Ilkeston Corporation Bill, Keighley Corporation Bill, Leyton Urban District Council Bill, Maldon Water Bill, Matlock Urban District Council Bill, Middlesbrough Corporation Gas Bill, Mid-Kent Water Bill, Northam Urban District Water Bill, North Warwickshire Water Bill, Norwich City Water Bill, Paignton Improvement Bill, Plymouth and Stonehouse Gas Bill, Rhymney and Aber Valleys Gas and Water Bill, St. Anne's-on-the-Sea Gas Bill, St. Helen's Corporation Bill, Southampton Gas Bill, Southend-on-Sea Gas Bill, Southend Water Bill, Southwark and Vauxhall Water Bill, Staines Reservoirs Joint Committee Bill, Thanet Gas Bill, Tottenham and Edmonton Gas Bill, Wey Valley Water Bill, Whitwick and Coalville Gas Bill, Wigan Corporation Bill, Wishaw Water Bill, Wymondham Water Bill, York United Gas Bill.

Incandescent Gas Lighting in Leeds.—The Lamp Committee of the Leeds Corporation have for some months been experimenting with incandescent gas-lights; and the results have proved so successful that the Committee have decided to extend the trials. Some members regard the light with much favour; it being estimated that on each lamp an annual saving of 10s. 6d. is effected, including breakages and the provision of new mantles.

The Fatality at the Heywood Corporation Gas-Works.—We briefly reported last week that a fatal accident occurred to William Cannon (age 33), on the previous Thursday, at the Heywood Gas-Works; and at the inquest yesterday week, an explanation was given as to the cause of the accident. It appears that Cannon went to the top of a coal-conveyor for the purpose of oiling it; and, while there, he tried to pick a piece of coal off the belting. To do this, he had to put his hand inside the guard; while the proper thing would have been for him to have stopped the machine. The lower part of his arm was caught by the machinery, and dragged completely off. The injured man was at once removed to the Rochdale Infirmary, where he died during the night. The Coroner (Mr. F. N. Molesworth) thought no blame could be attached to anyone except deceased; and the Jury returned a verdict of "Accidental death."

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Saturday, Feb. 5.

(*Before Mr. Justice* NORTH.)

Jordeson v. Sutton, Southcoates, and Drypool Gas Company and Others.

Mr. UPJOHN, Q.C., and Mr. DIGHTON POLLOCK appeared for the plaintiff Mr. HALDANE, Q.C., Mr. MACNAGHTEN, Q.C., and Mr. BOOME, for the Gas Company; and Mr. RAWLINS, Q.C., and Mr. SCOTT for the Contractors Messrs. Holme and King).

At the close of the proceedings in this case reported last week (p. 285), evidence was called for the defendants.

Mr. *R. Wissenden*, the Engineer in charge of the excavation, was the first witness. He stated that the work was commenced in July, 1896; the trench being 162 feet in diameter and 36 feet deep. The Company supplied them with a diagram showing the strata prior to commencing; and it was found to be correct. In deciding upon the system to be followed in excavating, the Contractors were influenced by the plan given to them. They started with runners 24 feet long, 7 inches wide, and 2½ inches thick. This length was chosen because they saw that it would take them below the bed of running silt, which was 22 feet from the surface; the top of the bed being 16 feet. The runners were got down by first excavating 7 or 8 feet of clay, and then placing them against the side of the trench with wailings 4 feet apart and struts. The excavation then proceeded for a couple of feet; and as the men dug, the runners were driven down a little in advance of the work. This was continued until they knew they were nearing water, when the runners were driven from the top by a pile-driver through the bed of silt into hard clay. Only about a hundred 24-feet runners were used, as they were unwieldy; and 18-feet runners were obtained. These were driven in in exactly the same way until the bed of silt was reached, when a length was put on top to make them equal to the 24-feet runners. During the work he went into the trench every day. There were no horizontal joints at any part of the bed of silt; and the runners were close together. The clay stratum at the bottom of the silt bed was impervious to water. The runners did not keep the water out altogether; a small quantity oozed through. The runners could not be caulked, as they were too close together. A pulsometer pump with a 3-inch delivery was used for 20 minutes out of each two hours. The work of timbering was carried out carefully and skilfully. The excavation was finished on the 15th of September; and they at once began building a 3 ft. 6 in. wall. As the work went on, they puddled behind the brick wall and left the runners in. The whole of the brickwork was finished before the earth inside was taken out. The method of internal settings, which the plaintiff alleged should have been adopted by the defendants, was only used when good ground had to be met with. It would have been impracticable in the case of the defendants' works; as the runners could not have been driven owing to the struts being in the way. The method they employed was as good as any he, as an Engineer, had heard of. It was the one he should adopt if he were going to make another excavation in the same soil.

In cross-examination by Mr. UPJOHN, witness said he should use runners where he thought he might come across bad shifty ground. The Hertzig method was impracticable. The struts could not be shifted; sometimes the pressure from without embedded them in the wailing to the extent of half an inch. He had had eleven years' experience on public works of this sort. His view was that, whatever had happened to the surface of the land, the water coming from the silt bed caused it. He only became acquainted with the silt bed when he was at work in Hull. The silt could be stood upon and dug by the workmen; and this actually happened. They started pumping when they got to the running silt stratum.

By Justice NORTH: They had commenced pumping when the men began to dig the bed of silt.

In further cross-examination, witness said the average quantity of sand excavated was half a foot a day; and the whole excavation was concluded in 2½ months.

The further hearing was adjourned till the following Tuesday.

Tuesday, Feb. 8.

On the resumption of the proceedings this morning,

Mr. *Wissenden* was further cross-examined by Mr. UPJOHN. He stated that when the workpeople struck the silt bed, there was only a small number of feet of water. There was not a sudden change. If a heavy rain came on, there would be more water in the trench than at other times. It was true that the water drawing from under the plaintiff's property had drained into the trench. Mr. George Oldfield, who made an affidavit when the case came before the Court on motion, was superintending on behalf of the Gas Company. He was constantly about, and knew what was going on. As a rule, there was no pumping on Sundays, though on one or two occasions there was. The water pumped up was black, and contained matter in suspension.

Mr. UPJOHN: With reference to the runners used. Were the toes sharpened?

Witness: No; but the blunt end could be driven down into about a foot of clay. In some places, they did not stop excavating the silt until it was drained.

In every instance were the vertical and horizontal joints so tight that there was no escape of water between them?—No. I saw that the water oozed through; the runners were not so tight together as to prevent this. We did not caulk the joints.

Re-examined by Mr. RAWLINS: The continuous pumping had been for longer periods after Sept. 15, when the excavations were finished, than before, on account of the heavy rain. The long runners were forced down as far as they could go before the silt bed was pumped.

Justice NORTH: Were they down to their full length before pumping began?

Witness: Yes; the water began about 16 feet down. We pumped at ordinary speed.

Mr. *Charles Gott*, M.Inst.C.E., said he was well acquainted with the strata of Hull, and with the construction of the different works there. He was acquainted with the construction of the pier, with the erection of the water-works, and with the sewers. He had examined the works in connection with the construction of the defendants' gasholder and the timbering, and the way it had been done. The vertical runners were quite close, and pressed together. They were on the plumb in line; and there was no question of irregularity about them. The runners were too close to caulk. The water which came out of the pump was discoloured and dirty; but it did not contain any silt that he could recognize.

Mr. RAWLINS: Did the work appear to you to be done well?

Witness: The work was done carefully, and in a proper manner.

How do you say the damage to the plaintiff's property has occurred?—The water coming naturally through the silt would do the damage that is said to have occurred; and I do not think it could have been done in any other way.

Give us your reasons for saying that?—The water spread evenly through the whole trench. The water coming out of the bed would cause the bed to diminish and shrink. If the silt itself had been withdrawn, and allowed to slip into the excavation, it would have made a hole in the ground; and instead of the gradual subsidence of the surface, there would then have been a sudden drop or fall where the silt had been withdrawn.

What would have happened then?—In that case, probably, the whole of the houses in Clyde Terrace would have fallen down.

Justice NORTH asked witness to give his definition of the silt.

Witness said the silt was fine sand. It was not soluble. It could not be properly described as like treacle, as one of the plaintiff's witnesses had stated. It was not fine mud or sludge, such as would be found at the bottom of a pond. Water drained from it freely, and left the sand behind. The water did not necessarily carry the sand along with it.

Mr. RAWLINS: Could the timbering of the trench have been carried out in the way described by Mr. Hertzig?

Witness: No.

Justice NORTH: Did it occur to you, when you were examining the excavation, that any protection could have been adopted which was not?

Witness: Not at all; the work had been very carefully prepared. Necessarily some damage, more or less, would be caused by a work of the magnitude of that of the defendants. The plaintiff's houses were very slightly built; the outhouses being only half a brick thick. Some of the cracks I noticed were not new, and were not caused by the excavation for the gasholder.

Mr. *Peter Gaskill*, a surveyor practising at Hull, in answer to Mr. RAWLINS, stated that he visited the works on Nov. 16, 1896; and he saw that there was no space between the long runners into which he could put his forefinger. The runners were perfectly tight together. He remarked, at the time of his inspection, that a very good job had been made of the work, and that nothing of importance had been omitted.

Mr. *J. W. Marsh*, an engineer of Burnley, who had had the general supervision of the works, stated that he had had great experience in sinking for gasholders; but he had not previously used the method of timbering adopted by the defendants. He had, however, found the system so good that he had employed it ever since. Witness was examined at considerable length; and his evidence was generally confirmatory of the other witnesses called for the Contractors.

Wednesday, Feb. 9.

Mr. *Marsh*, in further cross-examination, stated that there was water or water and silt, in the trench; but not in any considerable quantity. It came from the surrounding ground. In a gasholder trench he was dealing with now, the water was twenty times as much as in that of the defendants. Sometimes the pumps were going day and night. There was a grip cut in the trench to relieve the water, and was all the way round the trench. The workmen made it to keep themselves dry. There were one or two cases where some runners were lower than the others; but the bottom end of the long runners formed one straight line round the excavation. To obtain this result, they did not have someone to let the man at the top know when he was to stop driving. They got the runners down as far as they could, and this gave them some idea at the top how far they could go. Asked how he managed his measurements at the top, witness said they started with one runner 24 feet long. That was driven till it got to a certain distance. They then drove an 18 feet runner; and this gave them the datum of the third. They then got a datum for an early mathematical line. This was all round the trench. There was nothing remarkable about it. The foot of the runner would be below the bottom of the trench, or about a foot in the ground, to keep the runners from kicking up. A man was at the bottom assisting with his grafting tool. This was used in front of the runners.

Mr. HALDANE suggested that they should now identify the piece of ground; but after a short conversation this part of the case was allowed to stand over, to see if the plaintiffs admitted the defendants' contention.

Mr. *Thomas Newbigging*, M.Inst.C.E., in reply to Mr. HALDANE, said he had designed and constructed large numbers of gas tanks and holders, in various strata, from ordinary hard ground to mud, sand, and running silt. He was not in Court when Mr. Hertzig gave his evidence; but he had seen a transcript of the shorthand notes. He understood Mr. Hertzig's method, as he had had experience of it. It was the simplest way of shoring tanks and other excavations. He had seen the excavations of the defendants' works. When he was at Hull, on Nov. 24, 1896, the brick wall had gone up 17 feet. He had ascertained the way in which the defendants proceeded to carry out their works; and he had had sections given to him. From 1880 to 1884 inclusive, he was consulted as to the erection upon this very site of a chimney 80 or 90 feet high. He had made himself acquainted with the timbering of the soil; and he considered the defendants' method was preferable to that of Hertzig. Where the ground was solid, or comparatively so, Hertzig's plan was preferable. Asked whether the movement of the plaintiff's soil was a lateral one towards the excavation, witness gave a description of it by taking two books and showing how there was such a movement by the subsidence. The subsidence giving rise to cracks was to be accounted for by the withdrawal of water. This was the cause of the subsidence, which was unequal. The ground would go down more to the tank than to the houses. The effect of taking the water out was that the sand could dry up, and therefore there would be a subsidence.

Mr. HALDANE: Would you get the same result by making a well on the defendants' land?

Witness: Yes; they would have precisely the same result, but it would take a longer time.

Justice NORTH: That means a well running below the bottom of the running silt?

Witness: Yes.

Examination continued: He had seen the cracks on the plaintiff's land. There were a number of them which he did not think were caused by this subsidence at all. They were evidently old cracks, and did not arise from the excavation of the defendants' works. This was a very treacherous subsoil. He also saw cracks in the street; and he heard that they ran from east to west. Evidently they did not arise from the trenching; but he saw the cracks which did.

Justice NORTH: Which way did the cracks run that were caused by the trench?

Witness: From north to south. The cracks running east to west were due to the tilting-ground.

Mr. HALDANE: Did you see any indication of it being due to absence of the support in those from east to west?

Witness: No.

Taking the new cracks, to what cause did you attribute them?—To the withdrawal of the water.

Not to the withdrawal of the silt as well as the withdrawal of the water?—I came to that conclusion, because I knew from experience that very little silt would come out. Referring to Mr. Hunt's evidence on the second day's hearing, when that gentleman attributed the cracks to the withdrawal of the soil, witness said Mr. Hunt was dealing with what was quite different from silt. There was no comparison between the two. Through the quicksand there was always a rush of the water, and they could not by any possible pumping exhaust it. They might overcome the water and get it down to a certain level; but they could not get rid of it. There was no hiatus; it was always full of water, however much they pumped. It was quite different with silt. Here they had silt and mud and sand saturated. In that case the water was so sluggish in its flow that it stopped before it could come forward. Mr. Hunt sank a well outside his excavation altogether; and by means of this well he drained the whole of the surrounding land. He (witness) knew the land of the defendants, and there was no available space on it suitable for a large gasholder excepting where the excavation had been made. He knew the district the defendants supplied with gas.

Can you give us any figures?—Yes, the population between 1881 and 1891 had increased 35,000. A vast number of new houses are being built at the present time. New streets have been laid out, and the Railway Company are also adding to their works. The supply of gas has increased from over 84 million cubic feet in 1886 to 140 million cubic feet in 1896.

Do you consider, having regard to the consumption and the increase in it, that the proposed holder was a proper one for the purposes of the Company?—I do. It is such a holder as I should have recommended.

Cross-examined by Mr. UPJOHN, witness said he was familiar with the Company and their operations. He was their Consulting Engineer between 1880 and 1884, when they were carrying out extensive works.

Mr. UPJOHN said he did not mean to suggest that Mr. Newbigging was not an independent witness, but that this was his means of knowledge. Probably he knew enough of the defendants' operations to tell him this: Were the Company going to abandon one of the old gasholders?

Witness replied that they were; and it was his advice that they should abandon the smallest of the three. The new holder would supply the place of the old abandoned one. In his view, the district had somewhat outgrown the old plant of the larger and smaller holders. The new holder would supply an existing want. Having regard to the increase in the consumption of gas in the past, he thought it was prudent and wise to provide for a still further increase in the future. The new holder would supply the present insufficiency; but he should say in six years from now the defendants would want another. He knew that the Corporation had bought up the Old Town gas-works. He was the Engineer of the old Company; and he also engineered the second. He was sufficiently in the secret of the Corporation to know that they intended to abandon these works with the exception of the mains. At the present time, there were three sets of gas-works at Hull—those of the defendant Company, the works just acquired by the Corporation, and the British Company's works. The defendant Company was the second in point of size. He knew that the Corporation had opened negotiations with them to obtain a supply of gas from one or other or both the Companies; and he was also aware that they had completed negotiations to take a supply from the British Company. He thought that was for a period of three years. The Corporation had not negotiated with the defendants; they simply came to them and said: "On what terms will you supply us with gas?" The defendants made a tender for something like 1s. 6d. At the end of the three years, the Corporation might take some or all of their supply of gas from the defendants. It was possible, but he did not think it probable, that there would be a still further strain upon the supply.

Mr. UPJOHN: Then this new holder will be used for storing to some extent?

Witness: All gasholders are used for storing.

I mean they would keep a reserve of gas, besides the quantity necessary for the daily supply?—Yes.

You contemplate the use of the new holder to a very considerable extent?—Oh, yes.

In your opinion, would a gasholder of two-thirds the capacity be sufficient for present wants, having regard to the abandonment of the old holder?—I do not think it would be good policy; two-thirds might be sufficient just for to-day.

Justice NORTH: It might suffice for the present?

Witness: Yes. I believe as soon as the gasholder is started it will be continually used.

Cross-examination resumed: He did not think that the holder would have to go to its full height for nine months in the year; it would only be for three months in the winter. The consumption of gas was small in the spring and autumn. Witness then gave the dimensions of the holder, and described the cracks in the ground running from east to west. This showed a tilt in the ground in the direction of the trench. He had no knowledge himself as to whether silt coming away from the ground into the excavation was pumped away or not. He did not see it. He did not dispute what Mr. Gott said, that silt came under the head of water. Of course, it did. He disputed the correctness of the description Mr. Gott gave of that water—that it was soup; and he differed also from Mr. Hertzig on this point. He did not dispute that the silt was impalpable—very finely divided. It was rather hard, but very finely divided, sand and mud mixed. It was principally sand. If it was dried and rubbed about, it was something like a hard and gritty kind of flour.

Mr. UPJOHN: If there was an interstice in the joints of the runners sufficient for you to put your fingers in, would that be wide enough for the silt to go through?

Witness: Yes. Everything depends on the adequacy of the timbering to effectually seal this particular stratum. The defendants' timbering would be likely to ensure this result. The other systems rendered it by no means possible.

Are you able to say, of your own knowledge, whether the runners were carried through the silt and into the clay, so as to seal the runners?—I cannot state that of my own knowledge. When I said that only water came through the runners, I was assuming that the toes of the runners did go through the silt into the clay. My visit was in November. It was not after there had been a good deal of rain; it was rather fine weather. We had had a long Indian summer that year.

Justice NORTH: It might depend a good deal upon where you were.

Mr. UPJOHN: You did not see the works until the end of November?

Witness: No.

There was a good deal of time and opportunity for the joints to be sealing, and otherwise get into a better state than they were two months before?—Yes.

That must be borne in mind in dealing with this form of soil. Suppose you were going to seal up this bed of running silt with 18-feet runners, how would you proceed?—I would drive them down to the top of the soil; and I should expect to be able to do it. [Witness then gave a lengthy description of how the work was done.]

Mr. *J. J. Runton*, the Chairman of the Gas Company, in answer to Mr. HALDANE, said the new holder was necessary on account of the increased requirements of the district.

Cross-examined by Mr. UPJOHN, witness said he had not heard the whole of Mr. Newbigging's evidence; but he entirely concurred in what he did hear. The additional works were necessary. He also agreed with what Mr. Newbigging had said about the height of the gasholder in certain months.

Mr. *George Oldfield*, Manager of the Company, in answer to Mr. MACNAGHTEN, said he had heard Mr. Runton's evidence; and he agreed with him that the new gasholder was required. He prepared the table of the strata, after having four borings taken.

Cross-examined: What found its way into the trench was water, and not water and silt. The time when he took the samples was between when the writ was issued and when the case was first mentioned to the Court. He considered the site for the holder the only one available.

Professor *Blundell Smith*, an architect and surveyor, said he visited the plaintiff's houses on Saturday last. They were occupied by working people at 2s. a week. He did not think the new holder would much interfere with the enjoyment of the light of the plaintiff's property. If the gasholder was painted white, it would act as a reflector, and throw light into the windows.

Mr. *John Watson*, surveyor, deposed to having inspected the plaintiff's property in September, 1896, when £74 would, he said, have repaired the houses on the south side of the terrace.

Thursday, Feb. 10.

Mr. *Watson's* cross-examination was resumed this morning. He said he had inspected the plaintiff's premises in June and November, 1897. He could not remember whether there had been a good deal of rain in November, 1896. He could tell whether a crack was old or new, and whether it had taken place within three months; but he could not say about three years. He could not tell whether it had occurred in five or in seven months. Asked whether it was not the fact that, from the appearances of the cottages, he could see that they had been built in the way shown on a diagram placed in his hands—the main buildings first and the outbuildings after—witness said he had not observed it.

Justice NORTH: Do you recollect the distance the fracture was from the main wall?

Witness: No.

Mr. UPJOHN: Were the fractures in all the houses from No. 9 to No. 17, Clyde Terrace?

Witness: To the best of my belief they were. The old crack might take place in the brickwork, and not show itself in the plaster.

Justice NORTH: If you saw an old crack increasing, or a new crack come in, you would see there was some cause at work?

Witness: Oh, certainly. My contention is that there was a prior reason for the cracking.

In further cross-examination, witness gave his reasons for estimating the cost of the repair of the buildings at £74; but he admitted he had never got a builder's tender for the work. Prices had gone up 7½ per cent. since 1896. He could not say whether any other damage had occurred since his examination in November, 1896.

Mr. *Corbet Woodall*, M.Inst.C.E., examined by Mr. MACNAGHTEN, said he inspected the gas-works in April, 1897; but he could only judge the work as it had been finished.

Mr. MACNAGHTEN: Have you heard it described how the excavation of the trench was proceeded with?

Witness: I have; and in my opinion, under the circumstances, it was done according to the best method that could have been adopted. It is impossible to exclude water altogether from works of this kind.

What, in your opinion, caused the subsidence?—I am decidedly of opinion that the injury was caused by the withdrawal of the water from the silt bed.

Mr. UPJOHN (in cross-examination): Are you familiar with Mr. Hertzig's method of timbering?

Witness: I am. I do not say that that system could not have been applied to the defendants' works; but it would have been attended with much greater risk than the method that was adopted.

What difficulty would there have been in applying Hertzig's method?—

The difficulty in applying it to these particular works would have been that it would have caused some leakage in the neighbourhood of the horizontal and vertical joints. The runners were of varying length. Some had dollies on the top; and that was a very common way of getting the runners down.

Mr. Hertzig says that, by inserting a dolly, you reduce the force of the blow by 20 per cent.?—With great respect to Mr. Hertzig, I do not agree with that view.

In answer to further questions, witness stated that everything depended on the sealing of the watery stratum. He differed from the opinion that Hertzig's method would have been better in this case. He was not acquainted with the particular stratum in proximity to the gas-works.

Mr. *D. Wood*, Secretary of the Gas Company, examined by Mr. Haldane, deposed to the purchase by them of 15 houses close to Clyde Terrace.

Mr. Upjohn objected to evidence of this character being given. The value of one property was not a rule for getting at the value of another.

Mr. Haldane submitted that he was entitled to show that the defendants gave much less for these houses than plaintiff wanted for his.

Justice North sustained the objection.

Mr. *Martin Samuelson*, Engineer to the borough of Kingston-upon-Hull and to the Humber Conservancy, said he was not prepared to value the property in question. He knew the silt bed of the district very well. It would be inclined to cause much obstruction. He saw the works proceeding in September, 1896, and from time to time up to a few days ago. He saw the timbering; but he did not go down into the trench.

Mr. Haldane: Did you observe any indication of the silt coming into the joints?

Witness: Not in any quantity. There was always some silt coming through; but nothing of consequence.

Have you inspected the plaintiff's property?—Yes.

Did you see any indication of a lateral movement?—Not in the houses themselves. In the outbuildings, there was a slight indication. I did not attribute anything I saw to the giving of the timbering.

Questioned as to the sand and silt and the water in it, witness said there was no rush of water. Some silt might be pumped up with the water, but only a small quantity. He had conducted many operations in the bed of running silt nearly half a mile away from this property.

In cross-examination, witness adhered to his statement that no appreciable quantity of silt came through when the water was being pumped out of the trench.

This concluded the evidence.

Mr. Haldane, on behalf of the Gas Company, contended that it was necessary that the gasholder should be of the size the defendants were making it. Under the Company's Acts of Parliament, there was power to make the works; and in carrying out this power, he submitted that neither the Company nor the Contractors had been negligent. There was no reason for the exclusion of the powers which the Acts of Parliament conferred on them; and they could drain the water, notwithstanding the plaintiff's surface suffered, for the trenching was legal. He did not deny that damage had been done to the surface of the plaintiff's land by draining, or that there was interference with the plaintiff's light by the holder when fully inflated. The Company's Acts were passed with notice to the adjacent owners; and they gave power to the Company to do these works. They were powers which were in the nature of a duty; they were powers which the Company had no legal capacity to release. Therefore he referred to the Acts first, and showed that they authorized the making and storing of gas. There was an express power to the Company to make and store gas on these very lands, and to do all things necessary for carrying that purpose into effect. Although these powers had not been granted by the first Act, the omission was supplied by later ones; and the Company were empowered to purchase lands for the extension of their works. But they were at the same time placed under the obligation to give notice to adjoining owners. Their original Act limited their radius within 300 yards of houses adjoining the then works; but afterwards they were authorized to buy additional land, and to give notices. If notices were not served, they had no power to store gas there. He submitted that, according to the legal decisions, where Parliament had authorized any particular work to be done, it authorized all such operations as were necessary to bring about that end. The Act was passed in 1873. The houses were built in 1866; and consequently they had not acquired a prescriptive title to light which it was said the defendants' holder obstructed.

Friday, Feb. 11.

Mr. Haldane produced the Ordnance Survey and the deposited plan of the Company in 1873, to explain to his Lordship that the Company had erected their gasholders on land on which they were entitled to build them. He then proceeded to argue that, even if at that date (1873) there existed for adjoining property easements of light and easements for the support of the land, this could not be taken away, as far as the defendants' works were concerned. It was not necessary for him to go so far as that contention if he was right in saying that there was anything in the powers conferred upon the Gas Company in the nature of a *quasi* trust not capable of being released.

Justice North: You do not say that the Company were compelled to build this gasholder? No *mandamus* would lie if they did not.

Mr. Haldane said no; but if they did not build it, the contract would have been void. He then cited decided cases in support of his argument that the Company's powers were a trust, and that no prescriptive right could be acquired to light or to a support of buildings or property by other persons against them. He next dealt with the way in which the Company did their work in the erection of the new holder, and read the evidence of his witnesses to show that the work was done properly. He complained that a different case had been made by the plaintiff on the hearing of the action to that made when he brought on his motion for an injunction. On the motion, the affidavits were not to the effect that there was an escape of silt at the horizontal joints; whereas at the hearing of the action such a case was sprung upon the defendants.

Mr. Upjohn denied this, and said there was a clear reference to the escape of silt at the horizontal joints when the motion was made.

Mr. Haldane insisted that a new case had been started. He also contended that it was proved that Hertzig's method of protecting the excavations was not so good as that which the defendants adopted.

Mr. Macnaghten followed on the same side, and contended that at any rate it was nothing more than a question of damages. But still the defendants were not liable in damages, as they were under an obligation to do the work. They were compelled to supply the district with gas; and for this purpose they must have a gasholder. This holder could only be constructed on the land in question. The Company's Act authorized them to acquire more land for additional works. The remaining point against the defendants was that there was no compensation under the Act. But it did not follow that the defendants were not doing what they were doing under their statutory powers. Then, was there to be compensation under the Lands Clauses Act? It had been decided that there was not. In this case there were two considerations—one being that in the case of a gas company they could not get the power. Notices were given to the adjoining proprietors when the Company's Bill was before Parliament; and the persons on whom they were served had not opposed. Did they acquire a right to do so afterwards? He submitted that they did not.

Mr. Rawlins summed up for the other defendants. The Company contended that there was no negligence; and they relied on their Acts of Parliament to justify the works they had executed in their particular manner. They must prove that they could not do them in a different way. Had they a legal right to do what they had done? They had. If the plaintiff had a legal right to the support of his land, had the Company infringed this right? He submitted, on behalf of the Contractors, that they had not.

Mr. Upjohn then replied on the whole case. He asked what was the Gas Company's position in regard to their Acts of Parliament, and what were their powers? He referred to the smallpox hospital case, and that of *Trueman v. The London, Brighton, and South Coast Railway Company*, from the judgments of which he had ventured to extract four points. These were: On the true construction of the Act, no intention appeared to authorize an interference with private rights; whereas in Trueman's case the Act in question was a Railway Act, and a Railway Act constituted a particular class of legislation, with respect to which the intention of the Legislature to authorize an interference with private rights was now assumed. It was this assumption which constituted the real distinction between the cases. His second point was that in Hill's case nothing necessarily involving a nuisance was authorized.

Justice North: Only a smallpox hospital.

Mr. Upjohn: It was pointed out there that localities might have been got for such a building. A smallpox hospital was only mentioned in the Acts in a casual way.

Justice North: A hospital was mentioned.

Mr. Upjohn replied that the words "smallpox hospital" were not used in the Act. In Trueman's case the very acts complained of were in terms authorized by sections 82 and 198 of the Company's Special Act, and the acts were such as involved a nuisance. The works had to be done near a railway and near a market town. His third point was that in Hill's case there were no compulsory powers from the beginning to the end of the Act. In Trueman's case there were the usual compulsory powers found in a Railway Act. His fourth and last point was that in Hill's case there was no provision for compensation. In Trueman's case there was the provision for compensation which was usual in a Railway Act. The two instances did not fall within the line of compensation. Lord Selborne said the provision for compensation usually remained.

Justice North: Which, when interpreted, means that it did not apply to the case.

Saturday, Feb. 12.

Mr. Upjohn, continuing his reply, argued that there was no necessity for the defendants to construct their gasholder on its present site—it was not compulsory for them to do so by their Special Act. In 1873, when that Act was obtained, they had not acquired this land; and they did not do so till 1877. As in Hill's case, there was no provision for compensation in the Company's Act. Mr. Haldane's argument was that the site of the gasholder was a statutory one; but it was not so—it was *plus* the statutory site. The Company's Manager, Mr. Oldfield, admitted that the statutory site was not adequate to the then requirements, and they acquired other lands. It was a question of construction as to whether or not the Legislature in the present case authorized an interference with private rights; and he submitted that, according to his construction, it did not. There was a clause which expressly reserved the liability for nuisance in the Standing Orders of Parliament relating to gas-works. In Michael and Will's book this was made plain, for it was specified that gas companies, apart from their Special Acts, should not manufacture or store gas or residual products, so as to cause nuisance or risk of damage, within 300 yards of any dwelling-house without serving notice on the owners or occupiers. The Company's Act of 1867 incorporated the Gas-Works Clauses Act of 1847, the 6th section of which gave power to break up streets and interfere with other private rights, and to pay compensation for injuries. The defendant Company were not authorized to take more than certain land or to interfere with the private rights or easements of anyone.

Justice North pointed out that, although the Company were authorized to take a certain quantity of land, they were not compelled to take the whole of the scheduled land.

Mr. Upjohn replied that upon a portion of the land they could not manufacture or store gas, even though it did not interfere with or cause a nuisance to anybody. The learned Counsel then referred to the nuisance sections of the Act of 1847 with regard to the manufacture of gas. Was this legislation, he asked, like railway legislation, to be construed into granting power to interfere with private rights. Section 9 of the Gas-Works Clauses Act, 1871, said: "Nothing in this or the Special Act shall exonerate the undertakers from any indictment, action, or other proceeding for nuisance, in the event of any nuisance being caused by them." This section was wider in its scope than that in the Act of 1847. In the action of *The Attorney General v. The Gaslight and Coke Company*, which was a case of nuisance caused in the supply of six miles of streets in the City of London with gas, the Company admitted the nuisance, but contended that they were under an obligation to supply the gas by their Special Act, which incorporated the General Act of 1847, and that gas could not be manufactured without causing nuisance. Mr. Justice Fry held that this argument could not stand. The whole of the obligations imposed by the Special Acts of 1867 and 1873 were made subject to the condition that the Company must not create a nuisance; and they could

not justify a nuisance by setting up the plea that they were unable to discharge their obligations without creating one. The learned Counsel contended that the defendants might have constructed three low gasholders in place of one 70 feet high. He then went on to deal at length with the question of compensation.

The further hearing of the case was adjourned till Tuesday (to-day).

The Incandescent Gas-Light Company's Patents.

In the Chancery Division of the High Court of Justice last Tuesday, another action brought by the Incandescent Gas-Light Company, Limited, to restrain infringement of their patents of 1885 and 1886 came before Mr. Justice Gorell Barnes. The defendant was one Seligman; and, on the application of Mr. Walter, his Lordship granted an injunction, an inquiry as to damages, and the delivery up of the infringing articles.

Abstracting Money from a Prepayment Gas-Meter.

At the Bolton Police Court last Thursday, a soldier named Albert Henry Haslam, whose regiment is at present stationed in Bury, was charged with burglary and with stealing at the same time and place 5s. from a prepayment gas-meter belonging to the Bolton Corporation. A further charge was that he stole 10s. 2d. from the same meter on a previous occasion. Mr. Hall, who prosecuted on behalf of the police, said that on the 26th of December last the prisoner visited the house of a Bolton resident named Young. At that time he had no money, but the following day he was in possession of a considerable amount; and he explained this by saying he had borrowed some money from a publican. Between the 26th and 27th, the lock on the meter at Young's house had been broken, and the whole of the money extracted; and the prosecution alleged that this had been done by the prisoner. In regard to the second case, Mr. Hall stated that Haslam was seen to enter Young's back yard the previous day (the 9th inst.), while the family were out, and to leave the premises the same way some time afterwards. When the Youngs returned, they found that the meter had been again broken into—the lock having been removed entirely—and 5s. taken out. When apprehended, the prisoner denied the first robbery, but admitted the second; saying, however, that he only got 3s. 6d. Mr. Hall added that the Corporation had more than 5000 of these meters in use, and it was therefore necessary that they should be protected. The prisoner was committed for trial.

The Bakewell Gas-Works Arbitration.—The arbitration to fix the price to be paid for the undertaking of the Bakewell Gas Company by the Urban District Council, whose Bill was noticed in the "JOURNAL" on the 25th ult., commenced last Saturday at the Royal Courts of Justice. Mr. E. H. Stevenson is the Arbitrator for the Company; Mr. T. Newbigging is acting in a similar capacity for the Council, and Mr. C. A. Cripps, Q.C., M.P., is the Umpire. The Company were represented by Mr. A. J. Ram; the Council, by Mr. W. B. Hextall. Dr. J. Knox (Chairman of the Company), and Mr. W. R. Chester having given evidence on behalf of the Company, the following witnesses were called for the Council: Mr. B. Morton (Chairman of the Lighting Committee), Mr. W. Redfearn (Surveyor to the Council), Mr. G. H. Taylor Whitehead, J.P. (Chairman of the Council), and Stephen Haslam, a labourer in the employ of the Company. The further hearing was then adjourned till the 21st inst., when Mr. Corbet Woodall will give evidence. A report of Saturday's proceedings will appear next week.

The Proposed Amalgamation of the Redhill and Reigate Gas Companies.—An extraordinary general meeting of the Redhill Gas Company was held on the 29th ult., to consider the agreement entered into with the Reigate Gas Company for the amalgamation of the two undertakings. The Secretary (Mr. C. Read) having read the notice convening the meeting, the Chairman (Mr. J. Lees, J.P.) gave a history of the Company, and dwelt upon the advisability of joining their neighbours at Reigate. Mr. Hood, of the firm of Messrs. Radcliffe, Cator, and Hood, the Company's Solicitors, then read the agreement, which provides that for every £100 of stock the Reigate Company shall be paid £175 of 7 per cent. stock in the Redhill Company; that after "the appointed day" for the amalgamation to come into operation certain arrangements shall be made as to the officers; and that two Directors of the Reigate Company shall join the Board of the Amalgamated Company. Discussion having been invited, and there being no response, the Chairman gave some additional particulars, and said the agreement just read was a simple *bonâ-fide* business one; and he moved its confirmation, subject to such alterations as may be made by Parliament and as the Directors may approve. Mr. H. Stenning seconded the motion; and it was carried *nem. con.*

Arbitration as to Land needed for the Staines Reservoirs Scheme.—The Under-Sheriff of Middlesex (Mr. W. Ruston) and a Jury, sitting at the Law Courts, have recently had to adjudicate upon a claim made by the Eagle Life Insurance Company upon the Staines Reservoirs Committee for £80,000 compensation for lands compulsorily purchased near Staines for the purposes of their scheme. Mr. Carson, Q.C., and Mr. Montague Lush appeared for the appellants; Sir Edward Clarke, Q.C., M.P., Mr. A. T. Lawrence, Q.C., and Mr. Lewis Coward for the Committee. Mr. Carson stated that the land the Committee proposed to take was required for the construction of reservoirs; and the great bulk of it belonged to his clients. They objected to give up a part of it while they were compelled to keep other portions. The land was only 15 miles from Hyde Park Corner, was situated between two railway stations, had considerable frontages on important roads, and was ripe for building purposes. The witnesses for the appellants assumed that the entire area was suitable for building purposes; and their total calculations varied between £51,914 and £70,836. On the other hand, the witnesses called by Sir Edward Clarke based their estimates on only part of the ground being adaptable for building, and the remainder for agricultural purposes. Their estimates worked out to between £15,533 15s. and £17,121 15s. The Jury awarded the appellants £28,833, to which Counsel agreed that £500 should be added as damages for all land injuriously affected.

MISCELLANEOUS NEWS.

BRENTFORD GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at the Charing Cross Hotel—Mr. HOWARD CHARLES WARD in the chair.

The SECRETARY (Mr. W. Croxford) having read the notice convening the meeting, the Directors' report and the accounts for the past half year, which were summarized in last week's issue, were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he thought he might fairly congratulate the proprietors on the good account the Directors had the pleasure of laying before them. It was a *very* good account, considering the exceptional weather lately passed through, because, however pleasant it was to have warm weather, it was not, from a gas company's point of view, the sort of weather to conduce to the extension of their business or profit. It had been abnormally mild; and it must have affected the consumption of gas to a large degree. But, nevertheless, the Directors had the pleasure of reporting that the increase in the sale of gas during the half year had been considerable; it was no less than 9 per cent. This would have been considered in the old days a great deal; but when they came to get an increase of 9 per cent. with such mild weather, and in the face of the competition with the electric light in one or two parts of their district, it was rather marvellous. It was also gratifying to announce that, despite the much milder weather since the turn of the year, they had secured a further slight increase. The business had been growing in all branches; but the sale of gas through the prepayment meters had been extraordinary. The increase in the number of the consumers on that system was very great. On Dec. 31 last, they had 11,421, as compared with 8157 on the corresponding date of 1896. This was equal to an increase of about 40 per cent. in the year. With regard to the works, they had been erecting new manufacturing plant at Brentford, and were now busy constructing new plant at Southall. The plant at Brentford was completed in October; and since then it had been in satisfactory operation. They hoped the Southall plant would be finished during the present half year. But these additions to their plant and business required the expenditure of capital. Every one of the prepayment installations cost about £6; and they could not move to the extent of some 4000 installations in a year without spending a considerable amount of money. It would therefore be necessary for the Board to have power to issue further capital; and a resolution giving them authority would be proposed later in the proceedings. However, he did not suppose they would require to raise any of the money much before Midsummer. Looking at the capital account, it would be seen that £25,000 had been expended during the half year; and this was spread over three items. On new buildings and machinery, they had spent £12,680; on additional mains and services, £3393; and on meters and stoves, £8826—making a total of £24,899. There now remained on the capital account a balance of only £16,407. But as they had a heavy quarter's rental now coming in, and should have another after Lady-day, they would not want much more capital before about Midsummer. While on the subject of capital, he might point out that they had about £120,000 of premium capital on which, of course, no interest had to be paid. With regard to the revenue account, having obtained an increase of £10,392 in the gas and meter rental, it was only natural to assume a considerable sum had been paid for additional coal. But the figures showed they had only expended about £4200 on extra coal, in spite of the 9 per cent. increase in the business. The item of salaries of the Engineer and other officers at the works had decreased by about £500. This was accounted for by their having lost the services of Mr. Morris as Engineer, and having them instead as a Director. The carbonizing wages worked out to almost a fraction the same as they did this time last year. He thought they had reason to be proud of their carbonizing wages, as he believed they were lower than in any other Metropolitan or Suburban Gas Company; and he attributed this entirely to the courage of the Board in following the lead of Mr. Morris when he invited them to adopt the system of inclined retorts, which he perfected, and which was carried into effect by their present Engineer (Mr. J. Husband). In the repair and maintenance of works, there was an increase of about £1000. They might have expected a rise of something considerable, seeing the large expansion they had had in their operations. It was, however, right that he should explain that out of the total of £13,290 entered against that item, £1300 was charged to wipe out the old suspense account which appeared in the previous half-year's accounts. In changing their system from horizontal to inclined retorts, they had been obliged to destroy a good deal of plant, which ought, of course, to be charged against revenue. Since they had been at work changing the system, they had already altered three houses; and the plant they had destroyed had amounted to more than £13,131—indeed, considerably more, because some had been charged to immediate wear and tear. But the sum of £13,131 was put to a suspense account; and now it had been wiped out altogether. This was a very satisfactory feature, and one that tended to keep the capital account in a healthy condition. There was also in the suspense account a sum of £2059 which had been spent in re-plating a gasholder, and which had also been charged against revenue. Therefore the capital account had not been burdened by these things in the slightest degree. As he had said, the old suspense account had been entirely done away with; but they had lately pulled down some plant from No. 3 retort-house, and destroyed it, and had erected in its place a most efficient carburetted gas plant, which was in good order, and was doing its work extremely well. They valued the plant taken out at £4000; and this had been carried to a suspense account, which it was proposed to wipe out by four half-yearly sums of £1000 each. In the old days, before they were so much in the hands of the Board of Trade, they used to charge a sum to revenue for general depreciation. But the Board would not allow the Company to go on doing this. They said: "You may charge absolutely what you do against revenue, but you must carry it to a suspense account, and not charge it against one half year." There was one other item to which he wished to refer, and that was the repair and renewal of meters, which had advanced from £1563 to £2860. He thought the way they dealt with their meters and stoves was eminently advantageous both to the proprietors and to the consumers, because it kept the capital down;

and whatever did this tended to keep the price of gas low. They took care that the whole of the cost of new meters, stoves, prepayment meters and fittings, and the fixing of them, was so charged that no permanent burden could come upon the capital. They took the life of a stove at eight years, and charged 12½ per cent. on its value every year in the revenue account; and so at the end of eight years, the cost was entirely wiped out, though they were still good for service. Then they took the life of an ordinary meter at twenty years. They had responsible contractors who undertook to keep these in a perfect state of repair and renewal for that time. As a matter of fact, they condemned 5 per cent. of the meters every year; and the contractors had to replace them by new ones. With regard to prepayment meters, they had put their life at ten years. Therefore every year they wrote off 10 per cent.; and so in ten years they were entirely paid for. As to the prepayment fittings, they wrote off 15 per cent. of their cost each year. In this way they kept the capital account in a healthy condition; and he hoped by so doing they did not unduly burden the revenue account. Whatever they did was certainly not the cooking of the accounts in favour of making a great profit; it was just the other way. It would be seen that there was an increase from £664 to £1144 in the pension and provident fund, because, after the valuable services of their late Engineer, they could not allow him to retire without giving him a pension. On the other side of the account, they had received less for tar by £1860. The cost of coal in the half year was 12s. 5d. per ton. The net result of the working was that they had made a profit, after deducting interest, of £34,957, and they wanted £34,850 for the dividend. They were therefore able to pay the dividend and carry forward £107, which, added to the sum they brought forward at the beginning of the half year, gave them £23,880 with which to start the present year. The capital employed per ton of coal carbonized was now at the lowest point in the history of the Company. It was about £5 17s. per ton; while, when Mr. Morris first became their Engineer, it was something like £13 13s. per ton. This showed that the interests of the proprietors had not been neglected. They had been thoroughly well taken care of; and the march of the Company had been one of great progress.

Mr. Ulick J. Burke seconded the motion.

The Chairman, replying to questions, explained that a small decrease in the receipts for public lighting was due to the use of electric lighting in Ealing and Hammersmith, and also to the reduced consumption of gas in the lamps fitted with incandescent burners. A reduction from £1575 to £1490 in the stove-rental was due to the abolition of a charge of 6d. per quarter for stoves used in conjunction with the prepayment meters.

The motion was unanimously adopted.

A resolution was next passed declaring dividends at the following rates per annum: 5 per cent. on the 5 per cent. preference stock, 12 per cent. on the consolidated stock, and 9 per cent. on the new stock, 1881.

On the motion of the Chairman, seconded by Mr. Burke, the Directors were authorized, in pursuance of the powers conferred by the Company's Provisional Order of 1881, to raise, from time to time, as they thought expedient, any sums not exceeding in the whole £187,500 by the issue of new stock, and also £46,875 by the issue of debenture stock.

The retiring Directors (Messrs. Ward, Burke, and Neville) and the Auditors (Messrs. Field and Monier-Williams) were re-elected.

The services of the Chairman and Directors and of the various officials were duly acknowledged—a separate resolution being passed thanking the Engineer (Mr. J. Husband), who, the Chairman remarked, had been instrumental in making the Company a complete success, both in manufacturing and financial results.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the half-yearly meeting of shareholders next Friday, they state that the results of the working during the six months ending Dec. 31 last were largely affected by the very low prices of residual products, and to some extent by the mildness and openness of the weather. To the latter cause is attributed the smallness of the increase (2·6 per cent.) in the quantity of gas sold. In other respects, however, the working was satisfactory. A larger quantity of ammonia was produced; and the price of that article is improving. The accounts accompanying the report show that in the latter half of last year a sum of £7405 was spent on the works—£3560 on extensions of the manufacturing and distributing plant, £3840 on meters and stoves, and the remainder for new lamps at rent. The total expenditure at the close of the year was £664,049; leaving a balance of £25,275 unspent out of the £689,324 received. The total gas-rental came to £62,996, as compared with £62,784 in the corresponding period of 1896; the rental of meters (13,774 ordinary and 6738 prepayment), to £1485, against £1321; and of stoves (4936 ordinary and 4830 prepayment), to £1141, against £933. Residuals returned £18,312, as compared with £18,923; and the total revenue was £83,951, against £83,984. The outlay for the manufacture of gas was £57,983, of which £36,397 was for coal and carburine, as compared with £53,540 and £35,300 respectively in the latter half of 1896; distribution expenses were £5394, against £5593; management cost £3277, against £2824; and the total expenditure was £71,149, against £67,630—leaving £12,802 to be carried to the profit and loss account, as compared with £16,354 at the close of 1896. The main cause of the deficiency in the revenue account is to be found in the explanatory statements in the report. The amount available for distribution is £11,652, against £16,604 this time last year; and the reserve fund, which stood at £40,521 on June 30, will again have to be drawn upon to some extent if the proprietors adopt the recommendation of the Directors to pay the same dividend as the last—viz., at the rate of 5½ per cent. per annum. The works, under the supervision of Mr. Sydney Y. Shoubridge, produced in the past six months 540,714,000 cubic feet of gas, of which 498,960,000 cubic feet were accounted for. There were 54,499 tons of coal, 1031 tons of cannel, and 23,510 gallons of carburine employed in the manufacture of gas; the production of residuals being stated as follows: Coke, 694,098 cwt.; breeze, 11,328 yards; tar, 527,706 gallons; ammoniacal liquor, 11,718 butts. The returns of coke and breeze are estimated. There were 435 tons of sulphate of ammonia made, and 415 tons sold, in the half year, compared with 334 tons made and 302 tons sold in the latter half of 1896.

BROMLEY GAS CONSUMERS' COMPANY.

The Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the meeting of shareholders on the 24th inst., they state that the quantity of gas made in the six months ending Dec. 31 last was 8 million cubic feet more than in the previous half year. The increase, however, was not so large as in the second half of 1896. This was doubtless attributable to a generally reduced consumption among all classes of consumers, consequent on the exceptionally bright and sunny weather, with an unusually warm temperature, throughout the latter part of the year. The receipts for gas amounted to £16,397; residuals produced £4143; and the total revenue was £21,327. The expenditure on the manufacture of gas came to £11,304; on its distribution, to £406; management cost £1485; and the total expenditure was £14,945—leaving £6382 to be carried to the profit and loss account. This account shows a balance of £7190, out of which the Directors recommend the continuation of the dividend at the rate of 11½ per cent. per annum on the ordinary stock, and of 8½ per cent. per annum upon the 7 per cent. stock. This will absorb £5892, and leave £1298 to be carried forward. Under the supervision of the Company's Engineer (Mr. W. Woodward), 11,510 tons of coal and cannel were carbonized, from which 115,103,000 cubic feet of gas were made, and 107,745,600 cubic feet sold. The quantities of residual products were: Coke, 11,510 chaldrons; breeze, 1963 chaldrons; tar, 108,157 gallons; and sulphate of ammonia, 83¾ tons.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The revenue of the Bristol Gas Company in the half year ending Dec. 31 last was £125,347, as compared with £129,730 in the corresponding six months of 1896—a difference of £4383. In the report to be presented at the meeting of shareholders next Friday, the Directors explain that this is attributable to the reduction made in the price of gas in January last year. However, it is satisfactory to find that, notwithstanding the exceptionally mild weather, the sale of gas in the period covered by the report was the largest on record. The profit realized is sufficient to meet the dividend on the ordinary stock and the interest on the debentures; and there will be a balance of £15,148 to be carried forward.

The Bury St. Edmund's Gas Company held their half-yearly meeting last Friday, under the presidency of Mr. F. C. Andrews, who, in moving the adoption of the report, spoke of the steady increase in the consumption of gas. The Company did not, he said, intend to oppose the scheme of the Town Council for introducing the electric light, as there was a possibility of the present public lighting by gas being improved if the Council were disposed to spend more money. The Directors had been able to add £250 to the reserve fund, which increased the total to £4000. A dividend of 11s. per share (free of income-tax) was recommended on the 1849 capital, 8s. 6d. per share on the 1859 capital, and 8s. per share on the 1879 capital. Mr. Floyd seconded the motion, which was adopted.

In moving the adoption of the report, noticed last week, of the Directors of the Chester United Gas Company, at the half-yearly meeting on the 7th inst., the Chairman (Mr. J. Garnon) remarked that the causes of the diminution of the gas supplied were the adoption of the electric light, the extraordinary mildness of the season, and the use of improved gas-burners. The electric light was, of course, the most important cause, as it had taken away a considerable portion of the gas in the very heart of the city, where it was supplied with least cost and the greatest profit. The diminution in the supply from this cause had not been unforeseen by the Board, who had been making provision for it for a very long time, and had put their plant and works into the most efficient condition, so as to effect the greatest economy in the manufacture of gas. This had proved a sound policy, for with that increased plant they could hold their own, and render a very good account to the proprietors. The decreased sale of gas meant a diminution of revenue to the extent of £1210; but to set against this there was a reduction of the labour account and the coal carbonized. Another satisfactory feature was the small loss of gas by escapes, defective mains, &c., which amounted to a little above 4 per cent., whereas the average loss sustained by gas companies in this way was a little under 10 per cent. Notwithstanding the use of the electric light, the total number of gas consumers had increased during the year from 3570 to 3609, excluding the users of automatic meters. The number of these meters in use in 1895 was 109; in 1896, they had increased to 369; and last year, they were no less than 592. The proprietors might form their own conclusions from these facts that the Company were holding their own. Sir T. G. Frost seconded the motion; and the report and accounts were adopted. Dividends were declared at the rates of 10 and 7 per cent. per annum.

The Clayton, Allerton, and Thornton Gas Company report that the profits for 1897 amounted to £3694, and that, after payment of an interim dividend in August, at the rate of 6 per cent. per annum, there is a balance for appropriation of £2149. The Directors recommend a similar dividend for the past six months, adding £500 to the reserve fund, and carrying forward the balance of £119. The sale of gas produced £8876; meterrents, £440; and residual products, £1496.

At the annual meeting of the Durham Gas Company last Thursday, it was reported that the balance available for distribution was £2888, out of which the Directors recommend a dividend of 5 per cent. on original and 3½ per cent. on the additional capital for the half year ending Dec. 31; making, with the interim dividends, a total of 10 and 7 per cent. respectively for the year.

The half-year's profits of the Normanton Gas Company amount to £1041; making a total disposable balance, after providing interest on mortgages, of £2956. The payment of a dividend at the rate of 10 per cent. per annum is proposed.

The half-yearly general meeting of the Town and County of Poole Gas and Coke Company, Limited, was held yesterday, when the Directors presented accounts showing a profit of £1185 in the six months ending Dec. 31, 1897, as compared with £1416 in the corresponding period of 1896. This difference was more than made up by the increase in the cost of coal and the decrease in the value of coke and sulphate of

ammonia. The balance available for distribution (£5572) allowed of the payment of the maximum dividends, less income-tax.

The profits of the Wakefield Gas Company for the past half year (notwithstanding that the price of gas was reduced on Oct. 1 from 2s. 8d. to 2s. 6d. per 1000 cubic feet) were £6889. The Directors recommend the payment of the usual dividends of 11½, 9, and 8½ per cent. on the various classes of shares.

The profit of the Westhoughton Gas Company for the half year ending Dec. 31 was £729, which was reduced by loan interest to £630. The disposable balance is £632, out of which a dividend of 5½ per cent. per annum is to be paid.

At the meeting of the Weymouth Gas Company next Thursday, the Directors will submit accounts showing a profit of £2167 in the half year ending Dec. 31 last; and they will recommend dividends at the rates of 10 and 7 per cent. per annum—leaving £67 8s. 4d. to be carried forward. Notwithstanding the exceptional mildness of the weather during the latter portion of the half year, it is gratifying to find that the consumption of gas exceeded that of the corresponding half of 1896; the increase being 998,200 cubic feet, or about 3½ per cent. The sale of gas during the whole of the year 1897 was about 5¼ per cent. in excess of the quantity sold in the preceding twelve months.

The income of the Yeadon and Guiseley Gas Company for the half year ending Dec. 31 amounted to £5256; and the expenditure, to £3679—leaving a profit of £1577. This enables the Directors to recommend the maximum dividends of 10 and 7 per cent., and to carry forward a balance of £374.

The half-yearly general meeting of the York United Gas Company was held on the 3rd inst., under the presidency of Mr. J. R. Hill, the Vice-Chairman. The report, which was noticed in the "JOURNAL" for the 1st inst. (p. 245), was adopted; and the dividend recommended was declared. Subsequently a special meeting was held at which sanction was given to the Company's Bill now before Parliament.

Water Companies.

The half-yearly meeting of the Chester Water Company was held last Thursday; the Chairman (Mr. W. Brown) presiding. The Directors' report stated that the accounts showed a surplus of £2818; and adding £5192 brought forward, made a total of £8010. The interest on the preference capital required £450; leaving a balance of £7560. It was recommended that the usual statutory dividends be paid, which would absorb £1890; leaving in hand £5670. The Chairman, in moving the adoption of the report, said the opinion of experts showed that the water the Company supplied was of the highest quality; but in this regard the Directors set more store by the fact that the applications for supplies were so numerous. Mr. F. Roberts, in seconding the motion, said it had gone forth to the public that the Company were the instigators of the application for the formation of the Joint Committee for dealing with the pollution of the Dee. The Company made an offer of £500 per annum for three years and £300 per annum afterwards towards the expenses of the Joint Board; but the proposal did not emanate from them. It came from the Cheshire County Council and the Chester Town Council; and the Directors made the offer of the contribution entirely on the assumption that the Board would be formed in such a way as would protect the interests of Cheshire, of Chester, and also of the Company. The Directors did not admit that the Company required the protection of the Joint Board, because indisputably they were providing first-class water. Inasmuch, however, as there was a sentimental feeling in regard to the supply, they thought it better to make the offer of the contribution; but it was clearly understood between them and the County Council that the offer would be withdrawn if the Board were not so constituted as to protect the county, the city, and the Company as representing the water supply. Their offer had, therefore, fallen to the ground for the present. The motion was adopted.

At the half-yearly meeting of the East Worcestershire Water Company on the 24th inst., the Directors will report that in the six months ending Dec. 31 last there were laid 230 additional services; raising the total to 4675, exclusive of Droitwich and Rednal. The average quantity of water pumped was 608,407 gallons daily. Some short extensions of the mains have been made, involving an expenditure on capital account of £297. The accounts show a steady and satisfactory increase in the water-rents. It appears that the Company's supply came none too soon to the district—the water in the surface wells being very generally condemned; and the time is approaching when all the houses in Bromsgrove and Redditch will have an abundant supply of pure water from the Company. The profit is £1416, added to which there is the amount brought forward—£466—making a disposable balance of £1882. It is proposed to pay an increased dividend at the rate of 3½ per cent. per annum. This will absorb £1079, and leave a balance of £803.

The annual accounts of the Southport Water Company show a balance of £23,318; and the Directors propose to pay the shareholders a dividend at the rate of 9 per cent. on the original and "A" shares and 7 per cent. on the remainder of the paid-up share capital. Part of the dividend was distributed in August last.

At the half-yearly meeting of the South Staffordshire Water Company on the 24th inst., the Directors will report an addition of 1672 houses in the six months ending Dec. 31 last; making the total supplied 94,853. The gross amount of water-rates for the above-named period was £47,951, against £47,326, in the corresponding period of the previous year. The Directors have transferred £1000 to the depreciation fund; raising it to £11,790. After providing for interest on the debenture and preference stocks, the amount remaining for distribution, including £5046 brought forward, is £21,617; and the Directors recommend the declaration of a dividend for the half year on the ordinary stock at the rate of 6 per cent. per annum (less income-tax). The amount of this dividend being £17,255, there will remain £4362 to the good.

The half-yearly meeting of the Truro Water Company was held last Tuesday. The accounts showed a credit balance of £674. The Directors recommended that a dividend at the rate of 4½ per cent. per annum be paid, amounting to £360; that £300 be transferred to the capital account; and that the balance of £14 be carried forward. Mr. J. C. Daubez, who presided, moved the adoption of the report and accounts, and mentioned that in the year ending December, 1893, water-rents yielded £1885; in 1894, £1981; in 1895, £2014; in 1896, £2100; and in 1897, £2264. The total for the five years was £10,214—being an average of £2043 per annum. The balance of profit for the same period amounted to £5002—an average of £1000 a year. Of this amount they had transferred £2400, or about one-half, to the capital account, and they had paid £2480 in dividends. He believed they could see their way to a continued gradual increase in the income. In reply to questions, the Chairman said they would before long have to construct a new filter-bed or reservoir in order to keep pace with the increasing consumption. The report was adopted, and the dividend declared.

The annual general meeting of the Weardale and Shildon Water Company was held on Monday last week—Sir D. Dale presiding. In moving the adoption of the report, he said there was steady progress in profit earning noticeable in it. There was shown capital in excess of expenditure £31,581, including premiums on the late calls. It was intended by this capital to pay off mortgages, amounting to £29,920. The gross receipts had been £41,255, or £1121 more than in the previous year. Expenses had decreased for the year by £86. After deducting the interim dividend from the net revenue receipts of £32,265, and the payment of dividends (including the interim) amounting to 5 per cent. for the year, there was an undivided profit of £7528. This amount in hand might tend to give steadiness to the market value of the shares, and be available in future years for some increase in dividend. The motion was agreed to, and the dividends were approved.

The half-year's receipts of the Yeadon Water Company totalled to £1721; and the expenditure to £598. The amount available for dividend is £1321; and the Directors recommend a distribution at the rate of 5½ per cent. per annum on the original capital and of £3 17s. on the "B" stock. This will absorb £1009. During the six months, the filtering area of the Company has been raised, by the addition of a new bed, to 7225 square feet, which is capable of passing 550,000 gallons of water. The Company have entered into an agreement with the Horsforth Water Company to supply them with water for a period of five years; and this has necessitated an expenditure of £284 on capital account in the extension of the mains.

THE TRURO CORPORATION AND THE GAS AND WATER WORKS.

The Corporation of Truro had under discussion on Thursday last the question of approaching the Gas and Water Companies with a view to the purchase of their undertakings.

Mr. E. L. CARLYON, who moved for the appointment of a Committee to consider the desirability of the Council entering into negotiations with the two Companies, said there were two reasons why the Corporation should acquire the management of these highly important concerns. These reasons were that with regard to the water there would be a more secure and an improved service; and with regard to the gas they would have a cheaper and possibly a better supply, and the profits would go for the benefit of the ratepayers, from whose pockets they came. A saving would be effected by putting the two Companies under one management; and if that management were under the control of the Town Council, they would save a considerable sum in the shape of rent, Directors' fees, and possibly commissions. These items would go towards increasing the profits, and decreasing the price of water and gas. The Truro Water Company was formed in 1875; and in their Act there was a clause giving the Corporation power to acquire the works within five months of the passing of the Bill. That time had long gone by. The Company had passed through very troublesome times; but they had that day declared a dividend of 4½ per cent., so that the property was becoming exceedingly valuable. If the Corporation were going to purchase at all, now was the time to consider the matter. The Gas Company was formed in 1822, and in 1895 was registered under the Companies' Acts. As they did not possess parliamentary powers—a fact which they, as possible purchasers of the works, had to be thankful for—an arbitrator, in arriving at a price, would take this into consideration; and the Corporation would get the works for considerably less than would be required if the undertaking were a statutory one. He had been asked whether he was prepared to give an enormous sum for the gas-works in face of the fact that an electric light company might enter into competition with them. His answer was: "It does not matter whether we have the electric light or not; it will stimulate the demand for gas, and the gas-works will be of more value to us." If they were going in for one of these Companies, it would cost them very little more to procure an Act for purchasing both; and when they had them, it would require very little more to maintain them. His advice was that they should acquire both undertakings as soon as possible, for each was improving in value.

Mr. R. WHITWORTH seconded the motion.

Mr. J. T. JACOB was somewhat in favour of the Corporation becoming possessed of the water-works; but he objected to the purchase of the two undertakings being considered at once. It would be better, he thought, to have two Committees—one to deal with the question of the gas-works, and the other with that of the water-works.

Alderman T. L. DORRINGTON said that if they could buy one they could buy both. The question before them, however, was whether it was desirable for a Committee to inquire and report. He thought that when they went to the Companies and asked the price at which they were prepared to sell, they would be frightened by the answers.

Mr. CARLYON adopted a suggestion that the words "or either" should be added to the resolution, in order to empower the Committee to negotiate with only one of the Companies if desirable; and in this form it was carried.

It was then proposed that no shareholder in either Company should be elected; but this was rejected by a large majority, and the Committee was appointed.

The Price of Gas in the Blackburn Out-Districts.—As the result of a meeting of the ratepayers in the township of Livesey, the Parish Council have been instructed to request the Blackburn Corporation to cut off the supply of gas to the street-lamps in the township. This action has been taken because the Blackburn Gas Committee have increased the price of gas by 6d. per 1000 cubic feet. At a former meeting of the inhabitants, a resolution was passed strongly protesting against the increased cost of gas, and pledging those present not to pay the extra 6d.

SWADLINCOTE GAS-WORKS PURCHASE ARBITRATION.

Westminster Palace Hotel.—Thursday, Jan. 27.

(*Before Sir* GEORGE B. BRUCE, *Umpire.*)

The proceedings in this arbitration, which was held, under an Act obtained last session, for the purpose of fixing the amount to be paid by the Swadlincote Urban District Council for the undertaking of the Swadlincote Gas and Coke Company, Limited, were resumed to-day.

Mr. CORBET WOODALL, M.Inst.C.E., was Arbitrator for the Company; Mr. E. H. STEVENSON, M.Inst.C.E., acted in a similar capacity for the District Council. Mr. CLAUDE BAGGALLAY, Q.C., and Mr. MOON appeared for the Company; Mr. BALFOUR BROWNE, Q.C., for the Council.

At the close of the Company's case, reported last week (p. 295),

Mr. BALFOUR BROWNE, in opening the case for the Council, said his valuers started with the figure of £1523, which was agreed as the profit for 1896. From this Mr. Jones made a deduction, on account of too little having been spent on repairs and renewals. This, in principle, was absolutely right; but the amount was too small. With an ordinary company 5d. per 1000 cubic feet might be sufficient; but this was not an ordinary company, for they were only producing 7000 cubic feet per ton, whereas the usual quantity was 9000 cubic feet. An additional sum of 30 per cent. was therefore allowed on this item; the figure being 6·76d. per 1000 cubic feet. The next question was whether the revenue in 1896 was maintainable, even after allowing extra for wear and tear; and he contended that it was not. The revenue of 1896 was made up of payments for gas which in the first quarter were upon higher figures, as the Company were then charging more than in the last three quarters. A correction must therefore be made in respect of that. The evidence showed further that the large consumers would not take gas at the present price. The reduction in 1896 was less with the large consumers than with the small ones; but this could not go on, because the people who were using considerable quantities of gas were just those who could afford to instal electric lighting or gas manufacturing plant. Mr. Chester, the chief valuer for the Council, said that the reduction in the case of the small consumers would have to be extended to the large ones; and he had corrected the figures on that basis. The claim of Mr. Jones to add £225 for increase of revenue to be derived in the future in respect of the coke, ammonia, and railway siding, raised a most important principle. He (Mr. Balfour Browne) held that this claim should be disallowed altogether, because he contended that they had to value only what was existing, not what might have been. If it were allowed, the effect would be to make the Local Authority compensate the shareholders for the *laches* of their own Directors. Then the Local Authority said the cost of coal had much advanced; and they made an allowance for that. Adjusting the figure of £1523 upon the lines indicated, they obtained, as the maintainable profit, £1005 6s. 4d., in place of Mr. Jones's £1652. As to the number of years' purchase, 22 was taken as fair and liberal. Regarding the claim for surplus works, they had the Manager's testimony condemning everything except the mains; and Counsel asserted that the other evidence showed that there was no spare power. Having alluded to the startling leakage, for which no satisfactory explanation had been afforded, he referred to the profit on the sale of lime, which, though disputed in principle, had been allowed in order to save trouble; it being a very small item. In conclusion, he dealt with the 10 per cent. allowance for compulsory sale; asking the Umpire to say that if the Company were fully compensated without any such allowance, they should not have it.

Mr. *Samuel Wood*, of Messrs. Lass, Wood, and Co., examined by Mr. BALFOUR BROWNE, handed in a number of tables relating to the financial position of the Company. With regard to the capital expenditure, if the depreciation were deducted, the capital raised, as shown by the books, would exceed the amount spent. The agreed profit for 1896 was £1523 17s. 2d. Witness's figures differed in several points from those put in by the Accountant on the other side. In 1896, there was a reduction in the price of gas, of 5d. per 1000 cubic feet to small consumers, 7d. to intermediate consumers, and 2d. to large consumers. These reductions took effect in the three last quarters of 1896. The loss of gas in 1896 was 18·63 per cent., which was very high. One table showed that the mains laid to the end of 1897 were: 337 yards of 9-inch, 581 yards of 7-inch, 1579 yards of 6-inch, 4000 yards of 5-inch, 6000 yards of 4-inch, and rather under 4000 yards of 2-inch; while more than half was 3-inch pipe or under. A small portion had been laid or renewed last year.

Cross-examined: There was a sum of £1703, another of £1332, and others in 1881, 1882, 1883, and 1884, which the Company had expended on capital account, but which were accumulated profit, and which therefore the Company might have divided as profit.

Mr. *W. R. Chester*, M.Inst.C.E., examined by Mr. BALFOUR BROWNE, said the site of the gas-works was good; being fairly centrally situated and near a railway, which meant a saving in cartage. The area of the works was nearly all covered, with the exception of a small piece which would be required for gasholder extension. The new portions of the works, as far as they went, were satisfactory; but many of the other parts were not only inadequate for the present output, but in a very bad condition. The plan prepared by the Manager and his son for the reconstruction of the works, if carried out, would have been very prudent and profitable to the Company. Some such scheme must be adopted. The condensing, scrubbing, and washing plant, all the witnesses agreed was very poor, and inadequate to efficiently purify the gas. There was only one steam-boiler on the works; and therefore any accident to it would cause very serious inconvenience indeed. The purifiers were too small for the present make; and they were liable to frequent blowing and escape of gas, which not only meant loss but considerable danger. They should be replaced with more suitable ones. The storage capacity also was deficient, even supposing that all the holders were in perfect repair. One, however, was worn out, and should be abandoned immediately and additional storage provided, as indicated on the plan. This would dispose of all the surplus land. The present storage of tar and ammoniacal liquor consisted of three old boilers sunk in the ground, two of which would have to be removed when the retort-house extension was made. They were altogether insufficient; and the prudent course would be to add to them by converting the old gasholder into an additional store. This course would diminish the present holder capacity by 20,000 cubic feet. The distributing plant was in worse condition than the works, as was shown by the fact that the leakage in 1896 was over 18 per cent., and had been as much as 30 per cent. More than half the mains were of 3 inches diameter or less; and a large proportion, 2 inches or under. A great deal of relaying would be absolutely essential, for the 2-inch or smaller pipes would all have to be replaced. The expenditure on renewal and repair of mains in 1896 was 0·40d. per 1000 cubic feet, or £30 19s. 11d., which was utterly inadequate. The consumption of gas had increased 7·54 per cent. per annum compound, which was abnormal, and above the average. It was, however, not excessive, when the rapidity with which the district had developed was considered. He believed the increases in the future would not be so large. Regarding the stability of the district, he said it was practically a one industry place; there being several trades dependent on one—coal. When this went, the others would go too. Another sign of instability was that some of the largest consumers were adopting other illuminants, and had ceased taking gas. He commenced his valuation by taking the profit for 1896, £1523 17s. 2d. The expenditure of 3·32d. per 1000 cubic feet sold on repairs and maintenance for 1896, was quite inadequate. Mr. Jones increased the amount to 5½d.; but included in this was a sum which he took from another portion of the accounts, so that he did not really do what he purported to do. Witness put the figure at 6d. The make per ton of coal, however, only gave about 7000 cubic feet, against the normal of 9600 feet; and to compensate for this low figure, he added another ¾d. per 1000 cubic feet—making 6·76d., as the proper allowance for repairs and maintenance, which, on the sale of 18,705,700 cubic feet, equalled £268 2s. 3d. In the first quarter of 1896, gas was supplied at the old high rate, for which he made an adjustment allowing 3·86d. per 1000 cubic feet upon 5,087,000 feet, or £81 16s. 3d. Then when the reduction in the price of gas was made, the charge to the large consumers was only diminished by 2d. per 1000 cubic feet. In order to retain the large consumers, he held it to be necessary to increase this reduction by 5d., placing them on a level with the small consumers. This worked out upon 5 million cubic feet, gave £104 3s. 4d. Another deduction he made was in respect of the recent advance in the price of coal, which was likely to be more marked next July, when the obligations under the Employers' Liability Act came into operation. This advance he put at 6d. a ton, which, on 2578 tons, made £64 9s. Subtracting these sums of £268 2s. 3d., £81 16s. 3d., £104 3s. 4d., and £64 9s. from the £1523 17s. 2d., left £1005 6s. 4d. as the net maintainable income. This amount, capitalized at 22 years' purchase, made £22,116 19s. 4d., to which he added £69 6s. 3d. (three years' purchase of the profits on lime, £23 2s. 1d.), giving a total of £22,186 5s. 7d. The works, however, were very considerably deficient; and he had therefore provided a sum to bring them up to requirements sufficiently to maintain the supply of 1896. He allowed £235 to provide a deficiency of 157 tons in coal storage; £400 for enlargement of condensers and scrubbers, and provision of a new washer; £150 for duplicating the steam-boiler; £100 for converting the old gasholder tank into a tar and liquor storage tank; £200 for 30 per cent. deficiency in purifying plant; £750 for 30,000 cubic feet deficiency in gasholder, at £25 per 1000 cubic feet (including tank and holder); and £665 for the replacement of 3-inch mains with cast-iron pipes, including renewal of services. These sums totalled £2500, against Mr. Hepworth's £1049. Deducting this £2500 from the £22,186 5s. 7d., left £19,686 5s. 7d. as the commercial value of the whole undertaking. Regarding the price the Company were now charging, witness produced a table showing that it was higher than at a number of places in the neighbourhood. He also produced a structural valuation, in which he put the land at £531; works, £8420 9s. 9d.; mains and services, £5896 10s.; and meters, £1356 7s. 9d.—a total of £16,204 7s. 6d.

Cross-examined by Mr. BAGGALLAY: The £2500 would make the concern a first-class non-statutory one as regarded works and mains. A consistent increase of consumption would indicate fair management; but in a rapidly growing district, it would not necessarily mean that a proper price was charged. A fair allowance for maintenance and repairs would be 6d. per 1000 cubic feet. In the Ystrad case, he put it at 5·24d.; but the circumstances there were different. He reckoned it in the present instance at 6·76d., because of the small sale per ton of coal carbonized, which was partly due to leakage and partly to smallness of initial make. The proper amount of leakage would be from 8 to 10 per cent. Some of the present amount would be saved by the spending of the £2500. This £2500 would cause no increase in the production of gas, because he had provided for no more retorts. There would, however, be a saving by the extent of the leakage in the mains that was remedied. By having new retorts, which would cost £1000, the output could be increased to 10,500 cubic feet per ton, which, with an improvement of the mains, would reduce his 6·76d. per 1000 cubic feet to 6d. He did not know that the three quarters of 1897 corresponding to the three quarters of 1896 showed an increase of 20 per cent. He should expect an increase to follow the reduction in the price of gas. The difference between a statutory and a non-statutory company was the cost of an application to Parliament, *plus* the risk of the obligations Parliament might impose. He did not put the difference at two years, though that period was often taken. He agreed that the difference between the two classes was gradually lessening.

Re-examined by Mr. BALFOUR BROWNE: The increase of consumption in the first quarter of 1896 was 4 per cent.; and in the nine months following, 20 per cent. This showed that in the first period the price was too high.

Mr. *W. A. M'Intosh Valon*, J.P., examined by Mr. BALFOUR BROWNE, gave evidence corroborating Mr. Chester. A good deal had to be done, he said, to bring the works up to a condition to supply the gas required; and there was no surplus or excess plant. The maximum daily make in 1896 was 145,000 cubic feet; the total quantity of coal carbonized, 2578 tons; the gas produced per ton, 9085 cubic feet; gas sold per ton, 7256 cubic feet; total quantity sold, 18,705,070 cubic feet; and the waste, excluding 1½ per cent. consumed at the works, 18·63 per cent. No doubt a very large portion of the mains needed relaying, especially those of 2 inches diameter or under, to which he attributed a great deal of the leakage. The truest economy, seeing that the leakage was so large, would be to strip the mains from one end to the other. Being of cast-iron, they were probably eaten through with rust. He started his valuation with £1523 17s. 2d., from which he deducted £81 18s. to adjust the quantity of gas sold at the higher rate during the first quarter of 1896;

leaving £1441 19s. 2d. The cost of repairs and renewals, according to the accounts—viz., 1s. 9·15d. per ton of coal carbonized for the works, and 2·89d. per ton for the mains—was not sufficient. He had allowed 2s. 9d. and 1s. 4½d. respectively, which gave £273 10s. This figure worked out to 6·81d. per 1000 cubic feet. In addition to the reduction in price made by the Company, witness thought there should be a further reduction of 2d. per 1000 cubic feet on the quantity sold, which, after taking into consideration the probable increase in consumption in that year due to the reduction, he placed at £155 17s. 6d. Deducting these two items, left the maintainable profit of £1012 11s. 8d., which, capitalized at 22 years' purchase, brought out the sum of £22,276 16s. 8d. To this he added three years' purchase of the lime profits (£69 6s. 3d.), making £22,346 2s. 11d. This sum he further reduced by £2480 on account of deficiencies in the works; thus arriving at his final figure of £19,816 2s. 11d.

Cross-examined by Mr. Moon: He should advise the immediate demolition of most of the works, and that they should be re-constructed. The works had much deteriorated since 1892, when he valued them for assessment purposes. As the retorts came out of the old house, they should be replaced by others of better stamp. This would increase the make, and would be profitable; but he had not provided for this in his valuation. The reduction of 2d. per 1000 cubic feet would be profitable to the Company, and tend to stop the falling off in the percentage of increase which he saw was going on in 1897. A new holder could be put in one of the present tanks for £220; but it would be a very foolish thing to do. One corner of the land owned by the Company was now vacant.

Re-examined: The reduction of 2d. per 1000 cubic feet was necessary in order to maintain the present revenue; the Company would lose if it were not made.

Friday, Jan. 28.

Mr. Balfour Browne, in addressing the Umpire for the Council, referred to the sum of £442 which they were told had been expended by the Company since the end of 1896 on extensions; the cost of renewals having been previously deducted. This was money spent on capital account, and it should not be allowed. There was, however, as shown by the accountants, £446 of capital, authorized but unexpended; and he suggested that the one should be set against the other. With reference to the deduction the Council's witnesses made for the extra cost of coal, Counsel said it was necessary to adjust this item, just as the Company's own witnesses had adjusted the figures for renewals. The valuation was started with the profit for the year 1896; and then a deduction was made to bring the cost of maintenance and repairs to a proper level. In principle, both sides agreed there, though they differed as to the amount. At Nottingham, this expenditure was 4s. 1½d. per ton of coal carbonized; and the sum of 6·76d. per 1000 cubic feet sold allowed by Mr. Chester, worked out to exactly the same figure. If at large well-managed works such as those at Nottingham it cost so much, surely the amount would not be less here. Therefore he asked the Umpire to say that Mr. Jones and Mr. Hepworth were wrong in putting the item at 5½d. per 1000 cubic feet. The reduction in the price of gas, it was evident, was quite essential, because though in the year 1896 there was an increase of 16 per cent., the rise in the last nine months, when the decrease in price took effect, as compared with the same period of the previous year, was 20 per cent., so that the increase could not have been nearly so great in the first three months. This showed that the high price in the first quarter was crabbing the increase. The Company had had the benefit of the higher figure in that quarter, and so they should make an adjustment. The deductions by the Council's valuers were on the ground that they were necessary to enable the revenue to be maintained. Of course, if the Umpire thought the revenue could be kept up without this reduction, he would not allow it. The item in respect of the increased cost of coal, he justified on the ground that if the price increased, as they were told it would, the working expenses would go up; and in that case there was nowhere else for it to come from but the profit. These items would reduce the net maintainable profit to £1005. Then came the question of the multiplier. There was no hard-and-fast rule, as had been suggested, that for a statutory company 28½ years, and for a good, but non-statutory concern two years less should be allowed. The multiplier turned on the security for the income; and the security of a non-statutory company was bad as compared with that of a statutory company. First, under the Public Health Act, a local authority had a right to set up gas-works in competition with a non-statutory company, without any kind of prohibition at all; but it was definitely stated that an authority should not set up gas-works in the district of a statutory company. At one time, here the Council did contemplate setting up rival works, on account of the high price of gas; and if they could find the money to do so out of the rates, there was nothing to hinder them. If, however, they wished to borrow money, they would have to go to the Local Government Board for sanction; and it had, he admitted, been the practice of the Board not to allow a local authority to compete. To this extent a non-statutory company were secured; but it was not as good security as an Act of Parliament. Besides the Local Government Board might at any time change their policy, or even the Council might raise the money by a large rate. Counsel therefore held that there was a substantial difference between the classes, which was represented by five or six years, which was what was allowed here; the figure taken being 22 years. Regarding the 10 per cent. he asked the Umpire to say that, if the sum awarded, in the first instance, did not cover all the loss or damage sustained by the Company, something beyond should be given; but only sufficient to cover the loss or damage. If the Company obtained the full value, what further damage was done them? There might be something in the statement that the shareholders had to re-invest their money; but 10 per cent. which would mean from £2200 to £4800, in this case, was preposterous for such a purpose. The Company were practically willing sellers; for, in the parliamentary proceedings, their Agents said they would not further contest the principle of purchase raised in the preamble of the Bill, and Mr. Baggallay, too, had stated that he (representing the Company) could not oppose the transfer as a question of principle. This meant that the Company were not unwilling to sell. The one thing fought in Committee was as to whether the arbitration should be under the Lands Clauses Act or the Arbitration Act; and the only effect of giving the former Act, was that if they could show damage beyond the amount awarded, the Company should have something for it.

Mr. Baggallay, in replying, submitted that if this were a compulsory purchase the Company were unquestionably entitled by custom to the 10 per cent. allowance. Section 6 of the Act undoubtedly, on the face of it—and there was no qualification—indicated compulsory purchase; and it was none the less compulsory because when in Parliament, and knowing what was likely to happen, the Company declined to fight. Moreover, Mr. Balfour Browne several times in the course of the proceedings distinctly stated that the purchase was compulsory; and on one occasion, when discussing the effect of putting in the Lands Clauses Act, he said: "When you put in the Lands Clauses Act, you practically direct him (the Arbitrator), as a matter of practice, to allow 10 per cent., whether they are entitled to it or not." As to the capital expenditure of £442 on mains since 1896, Counsel contended that it should not be set off against the unexpended capital; for, whether the capital existed or not, at the present moment, under the Act, all cash, whether in hand or at the bank, was to remain with the Company. Further, the capital expenditure was undoubtedly larger than the £13,756 shown by the books, because even Mr. Chester's structural valuation was £16,204. In the "ordinary course of business," the Company were entitled to expend this money; and in that case, the Act said the Council were to pay for it. What had to be ascertained was primarily the value of the concern to the vendors; and not only its patent value, but its latent value, was what the Company were entitled to. Both Mr. Jones and Mr. Hepworth admitted that a certain amount would have to be laid out on the works; but this sum was all that was necessary to place them in a position to supply the present consumption of gas and to make the present profit. It was no part of the Umpire's duty to see what it might be prudent for a man to do in view of a future increase of consumption or profit. He quite admitted that it was worth the Company's while to reconstruct, but not if the object was simply to maintain the present profit. The next thing was the allowance for wear and tear, which the Company's witnesses put at 5½d. per 1000 cubic feet, and Mr. Chester at 6·76d. In this connection, Counsel pointed out that Mr. Chester allowed in the Ystrad case from 5d. to 5½d. per 1000 cubic feet, the figure at Nottingham being about 5½d.; and that the averages, as given in Field's tables, for several groups of concerns, was lower than the Company's figure. He held that there were no special circumstances which would render this place different from Nottingham or Ystrad, and therefore the deduction of £100 allowed by the Company's witnesses should not be augmented. Having briefly alluded to the claim in connection with the siding, which the Company were clearly entitled to, he passed to the coke and ammonia items. If they deducted the £1000 mentioned by Mr. Hepworth for expenditure on works, and allowed an enhanced sum for wear and tear, were they not entitled to credit for the extra residuals that would be produced? Coming to the question of the multiplier, he said it was not denied that a good statutory company was entitled to 28½ years; the only dispute being as to what was the difference between such a company and a well-found non-statutory one. Both in this and in the Ystrad case they had it from Mr. Jones that, for the last five years, the difference would only be about two years; and Mr. Chester said it was less than it used to be, and that it was only two years, though he made it five. If this were a dilapidated concern, Counsel thought 22 years would be right; but seeing that they were converting it into a good undertaking by this expenditure for maintenance and on capital account, the full number of years' purchase of a first-class non-statutory concern should be given. Then if there were any surplus works, the Company were certainly entitled to an allowance, because it was impossible to tell now what would be the profit earned hereafter. Regarding the £2500 allowed by the other side for capital expenditure, this would carry out the reconstruction on the unauthorized plan—practically make a complete utilization of the land, and provide for a supply of double the present sale of gas. All that would be wanting would be £1000 to put the retorts right. Counsel then entered upon a long calculation, with the object of showing that with all this expenditure a further profit of £330 per annum would be available. This was strong testimony to the fact that the present profit was maintainable, because, by this small capital expenditure, all this increased profit could be earned. Therefore the expenditure the other side suggested ought not to be deducted, because if made it would be immediately profitable. As to the reduction of price being due to loss of custom, he said the increased sale in the first quarter of 1896 (when the reduction was not operative), over the same quarter of 1895, was 350,000 cubic feet. The increases in the succeeding quarters, compared with the corresponding quarters of the previous year, were 100,000, 700,000, and 1,200,000 cubic feet respectively. The increase of 350,000 cubic feet demonstrated that there was no diminution in the consumption; and consequently the reduction in price could not be attributed to that. The further reduction of 2d. per 1000 cubic feet all round, Mr. Valon allowed, as he said, in order to maintain the profit; but this was allowing it twice over, because even after the reduction, he would still leave the profit as it was now. With reference to the allowance of 6d. per ton for increase in the price of coal, he held that it should not be admitted, inasmuch as it was entirely speculative. In conclusion, he referred to the allegation as to the mismanagement of the concern. This, however, only affected the internal management of the Company—not the consumers, as was clearly shown by the increased purchases and the absence of complaints. They might not be a strictly well-managed Company, according to the Board of Trade requirements and returns; but they were perfectly well-managed as among themselves, and as regarded the public.

As a result of conversation which passed at the commencement of the proceedings, and which was continued on the conclusion of the speeches of Counsel, the following short statement to be incorporated in the award as part of the terms and conditions, was agreed between the parties to the arbitration:—

(1) The date of transfer to be April 4, 1898. (2) The undertaking to be deemed to be handed over as from midnight on Sunday, April 3—that is, from that date the profits belong to the Council, and 4 per cent. interest to be paid to the Company until purchase-money paid. (3) Wages and outgoings to be paid by vendors to close of April 2. (4) Book-debts due to the Company to be taken to by purchasers at usual trade discount (including costs of collection), with an allowance for bad or doubtful debts; any case of dispute to be settled by Messrs. Lass, Wood, & Co., and amount ascertained to be paid in a month.

The proceedings then closed; it being arranged that the Umpire and Arbitrators should pay a visit of inspection to the works.

ELECTRIC LIGHTING NOTES.

The Ipswich Town Council have not yet made up their minds on the subject of electric lighting. They obtained a Provisional Order in 1897; and the Electric Lighting Committee last Tuesday recommended that the necessary steps should be taken to borrow £36,200, to carry out the powers conferred by the Order. The discussion of the proposal was distinctly in opposition to the Council undertaking electric lighting; and it resulted in the recommendation being referred back to the Committee, with an instruction that they should consider offers which had been received from Companies who were prepared to work under the Order.

The report of the Directors of the Westminster Electric Supply Corporation for the past year states that the supply of current, which on Dec. 31, 1896, was provided for the equivalent of 249,318 lamps of 8-candle power, had increased by Dec. 31, 1897, to the equivalent of 290,561 lamps; and at present there are on circuit the equivalent of 292,883 lamps of 8-candle power, and applications have been received for a further 10,886 lamps. The net revenue amounted to £49,461. An interim dividend at the rate of 8 per cent. per annum, for the half year ended June 30, has been distributed. The balance to the credit of the account is £34,014; and the Board therefore recommend a dividend at the rate of 16 per cent. per annum, less tax, for the past six months—making 12 per cent. for the year—carrying forward £3119. The Directors, having considered the question of the provision of future capital, gave notice to pay off the present mortgage debentures bearing interest at the rate of 5 per cent. and 4½ per cent. per annum on March 1, and have created new first mortgage debentures of £250,000, bearing interest at the rate of 3½ per cent. per annum. Of this amount, £200,000 has been issued; and after providing for the repayment of the old debentures, the balance will be expended in further plant and machinery, and the extension of existing stations.

Mr. Albert Gay, the Electrical Engineer for Islington, has issued his annual report; and the daily papers have given unusual prominence to the following paragraph therefrom: "The gross profit during 1896 amounted to about £1615, or 21 per cent. on the revenue; while in 1897 the gross profit was about £4432, or 36 per cent. on the revenue. This sounds very plausible and satisfying to the uninitiated ratepayer who does not trouble to look into the figures for himself. These prove that, instead of a profit, a net loss of £318 on the year's working has been made on a capital expenditure of no less a sum than £144,226. Had the department, however, really made a profit, as its advocates would have one to believe, it should be borne in mind that the public were compelled to pay £4030 for lighting the streets—more than half the year's revenue from the sale of current. The Engineer himself admits that "nothing has yet been set aside towards the depreciation of plant and machinery, or by way of provision of sinking fund for renewals"—a method of keeping accounts peculiar to municipal electric light undertakings—and if the employment of the very large amount the Vestry have borrowed (£153,977) brings in no better result than an annual loss of £318, it is probable that the plant and machinery will have been renewed out of further borrowings long before there is any surplus to set aside for depreciation.

Now that the electric light undertaking at Torquay is approaching completion, members of the Corporation are beginning to discover that there are limitations to what can be done with electricity. At the meeting of the Town Council yesterday week, objection was taken to the proposal of the Electric Lighting Committee to turn off the light at 1 a.m. This, it was said, would be too early for hotels, and would be a serious inconvenience generally; and the fear was expressed that by making a bad start the success of the scheme would be endangered. Another complaint was that the illumination of the pier and gardens—which was to be one of the great attractions, and was to effect a considerable saving as compared with gas—was eliminated from the scheme. The Mayor and other gentlemen advised those who complained to have patience. They explained that to supply the light throughout the 24 hours would mean an extra expenditure of £1000 a year; and though at present it was thought desirable to turn it off at 1 a.m., it was hoped they might arrive at some compromise, whereby the requirements of all their customers would be met. As to the illumination of the pier and gardens, this might come later; but now the Committee were anxious to save all they could. This only partly satisfied the critics, for the rejoinder was that the cost of the plant for lighting the pier and gardens was included in the £23,000 borrowed for the works; and as the whole of the money has been spent without making this provision, more would have to be borrowed before it could be done.

We have recorded in the "Journal" from time to time the progress of the negotiations between the Sheffield Corporation and the Sheffield Electric Light and Power Company in regard to the purchase of the undertaking of the latter by the Corporation. The terms of the Provisional Order sanctioning the purchase were that payment was to be made in stock of such a nature as to produce an annuity of 5 per cent. on the amount of capital expended. It may be remembered that a difficulty arose in the interpretation of these terms—the Company claiming payment in irredeemable stock which they said the Corporation had no power to issue; and the latter asserting that they had such power. The point in dispute came before Mr. Justice North, who decided against the Corporation, who thereupon had to make fresh terms with the Company. After protracted negotiations, an agreement was arrived at; and it was submitted to the Town Council by the Parliamentary Committee at the meeting of the former body last Wednesday. The new terms are briefly as follows: The Company have spent £124,472 on their undertaking; and the Corporation are to pay in respect of £118,500 of this sum at the rate of £220 per £100 in new 2¾ per cent. stock, which is not to be redeemable before 1925, or, instead thereof, if required by the Company, £213 8s. in cash, to carry interest at the rate of 5 per cent. per annum from the day fixed for the completion of the purchase until actual payment. The balance of £5972 is to be paid in cash at 5 per cent. interest. The Company take the net profits for last year—£10,562; and they are to receive £5726 for their stock-in-trade and stores. The agreement was accompanied by a report by the City Accountant (Mr. W. F. Tasker) on the financial aspect of the proposed purchase. The question gave rise to a long discussion; but in the result the Council unanimously sanctioned the purchase on the terms set forth. The Company's Manager and Secretary, as well as the officers and servants, are to be taken over.

THE METROPOLITAN WATER SUPPLY COMMISSION.

Ninth Day—Monday, Feb. 7.

(*Viscount* Llandaff, *Chairman*, *Sir* John E. Dorington, Bart., M.P., *Sir* G. B. Bruce, M.Inst.C.E., *Major-General* A. de Courcy Scott, R.E., *the Right Hon.* J. W. Mellor, Q.C., M.P., *Mr.* A. de Bock Porter, C.B., *Mr.* H. W. Cripps, Q.C., and *Mr.* R. Lewis.)

The Commission sat again to-day in the Moses Room of the House of Lords.

The following are the Counsel engaged: Mr. Pope, Q.C., and Mr. Claude Baggallay, Q.C., for the New River Company; Mr. Littler, Q.C., and Mr. Lewis Coward for the Kent Water Company; Mr. Pember, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. Rickards for the Chelsea Water Company; Lord R. Cecil for the Hertfordshire County Council; Mr. Balfour Browne, Q.C., and Mr. Freeman, Q.C., for the London County Council; Sir R. Nicholson for the Middlesex County Council; and Mr. Gabriel P. Goldney (Remembrancer) for the Corporation of the City of London. The Southwark and Vauxhall Water Company are represented by Messrs. Bircham and Co.

Mr. *Haward*, in further examination by the Chairman, said, according to his estimate, if the transfer of the undertakings of the Companies to a public authority were to be made, and the security of the rates were given, they would be adding to the capital value of the concerns about £6,000,000. In his opinion, the method of purchasing by permanent Metropolitan annuities was bad in the public interest. The County Council should have the power to make the purchase by cash payment, or, if agreed between the parties, by annuities or stock. Payment by means of terminable annuities was not regarded as very desirable in the case of a public authority. It would stereotype the rate of interest for the whole period. The basis upon which the annuity was calculated—say, 2½ or 2¾ per cent.—would be the rate of interest right through the period of the annuity; whereas if they raised the money by the issue of stock, they could take an optional power of redemption after a certain period, and so take advantage of any change in the rate of interest. Further, with a terminable annuity, the holder each year received a portion of his capital back, which many people objected to. It would also be an unsuitable investment for trustees; and then the Inland Revenue authorities could claim for income-tax on the whole instalment—on the portion which represented capital, as well as on that which represented interest. The existing debenture stock of the Companies witness suggested should be taken over by the purchasing authority, with power of redemption within a limited period. With reference to the large amount of debenture stock the Companies at present had, he pointed out that its effect was to increase the value of the concerns very largely as compared with others enjoying the same income, but not having so great a proportion of debenture stock. Generally any purchasing authority giving the security of the rates, as well as of the water charges, could borrow at a lower rate of interest than the Companies could. As to the rate at which the Council could borrow, witness said last July they raised money at 2½ per cent. To this he should add 2s. per cent. for composition for stamp duty, management of stock, &c.; so that the total would be about £2 12s. per cent. The nominal rate at which the Companies could raise debentures was 3 per cent.; but he thought the effective rate would be 2⅞ per cent.

The Chairman: Then the advantage to the County Council would be something less than 8s. per cent?

Witness: No, because the Companies could not go on raising money by debenture stock. They must issue shares. Ordinary stock would be created at about 3¼ per cent.

Mr. Rickards said the Chelsea Company had recently issued £50,000 odd of debenture stock. The rate fixed by the Governor of the Bank of England was 2¾ per cent.; and a slight premium was obtained. The debentures were issued at par, and were redeemable in 25 years.

Witness remarked that the Chelsea Company was the only one in which the Governor fixed 2¾ per cent.

Mr. Pember stated that the East London Company had raised money at £2 16s. 10d. per cent.

Witness (continuing) said he thought the difference between the rates at which the County Council and the Companies could raise money was rather over ½ per cent. As to the term of years for the repayment of the money which would have to be borrowed to purchase the concerns, the County Council thought the sixty years which applied to the present capital expenditure of local authorities should be extended, as in the case of a number of provincial purchases. The Government, in the Bill of 1880, proposed that the term should be eighty years, with the further provision that the sinking fund instalments were not to commence until twelve years after the completion of the purchase. Taking these payments, together with the amounts which the Council would have to expend on account of further works, he still thought the transfer would not cause the rates to go up. Various economies might be effected. The Directors' fees and allowances paid in 1896-7 totalled to £28,345, which sum would be wholly saved to the purchasing authority. There would be some board of direction; but they would not necessarily have to pay the members. Members of the County Council were not paid.

The Chairman: You do not suggest, do you, that these eight Companies could be managed by unpaid officials?

Witness: The question here is of Directors. Of course, official salaries are included under other heads. In the provincial cases of purchase, the Water Committees of the Corporations correspond to the Directors.

Mr. Lewis: Have you provided for compensation to the Directors for loss of office?

Witness: No; there is nothing deducted for compensation. I do not know why the Directors should be compensated.

Mr. Pember: They always are.

Mr. Littler expressed the same opinion.

Mr. Baggallay said in the two Bills of 1895 the County Council themselves provided compensation for the Directors.

Witness (continuing) said that under the head of salaries and superannuation the Companies paid last year £49,955—say, £50,000—of which he took 10 per cent., or £5000, as the saving. Obviously, in case of amalgamation, economy would result. For instance, they would not want eight

Secretaries to manage these concerns at high salaries. The Commission to the collectors cost £50,250. Here a good deal of saving would be possible. He estimated it at 20 per cent., or £10,000. Under the head of law and parliamentary expenses, he put the economy at £10,000; and under stationery, printing, and general expenses, at £5000. These items came to £58,345, as the saving which could be effected under the head of management—a sum which the Commission would be safe in putting at £50,000. The bulk of this saving would still remain, even if the County Council, after purchasing the eight Companies, had to split up the whole concern among the six counties.

By Major-General SCOTT: He thought the members of a water committee took as strong an interest in the success of an undertaking as a board of directors. On the whole, perhaps, the engineer to a local authority might be in a more responsible position than the engineer to a public company. He should therefore be better paid; but he doubted whether he was, as a rule.

Further examined by the CHAIRMAN: The earliest date at which the transfer could take place he put as April 1, 1901; and judging by the figures of the past seven years, the Council would in the year 1901-2 possess a gross income of £1,300,000. The interest on debenture stock and preferential charges—supposing the liabilities were taken over as they stood at March, 1897—would amount to £239,270. Then he calculated that, on account of capital expenditure already sanctioned by Parliament, the Council would have to spend by 1901 £2,750,000, involving an annual payment for interest of £80,000, which, *plus* the £239,270, made roundly £320,000. This, subtracted from the £1,300,000, left £980,000 as the sum available to pay interest and provide for sinking fund. Adding the £50,000, brought up the total to £1,030,000. The total sum, allowing interest at £2 12s. per cent., and calculating the sinking fund instalments on the 2¾ per cent. table, which would have to be provided to extinguish each million of capital, was £33,353 for sixty years, £30,026 for eighty years, and £28,312 for a hundred years. Supposing the Council were allowed eighty years, the £1,030,000 would be sufficient to meet the charges on 34·3 millions of money. As to providing the extra funds that would be needed to meet the charges on the 15 millions which it was estimated would have to be expended within the next fifteen years, witness suggested that they might come out of the increased income which would follow the growth of the population. He could give no estimate of what charge this extra expenditure, whatever it was, would throw upon the purchasing authority; but this was one of the things an arbitrator would consider when fixing the price. The figure of £980,000 did not represent the income which would have to be purchased, because by the time that sum was coming in the Companies would have to pay £56,000 a year to the Chamberlain of the City of London under the sinking fund clauses—reducing the income to £924,000. He should certainly expect, too, that whatever the sum in the hands of the Chamberlain was, it should be handed over to the purchasing authority.

By Mr. PORTER: The Companies had written off nothing for depreciation, so that the concerns stood at their original cost.

By Major-General SCOTT: The County Council, in making the purchase, would be buying the right to supply in the next 33 years 5½ millions more people than at present. Undoubtedly the market value of the concerns was affected by the prospect of the Companies that they would have to supply this large population. This would be an asset which would be set against the heavy capital expenditure which had been foreshadowed. The Companies seemed in no hurry to part with their property, and were pretty well content to meet the heavy capital liabilities of the future, because they thought they could make a profit. If, however, the Companies could make a profit, the County Council, seeing that they could raise money ½ per cent. cheaper, could make more.

By Mr. LITTLER: His figure of £39,000,000 represented the market or Stock Exchange value of the Companies at a particular date; but he had no knowledge of whether companies were always bought at more than their market value, nor as to the allowance of 10 per cent. He agreed that, at 33½ years' purchase, the price would be £43,000,000. The claim for back dividends in the case of one or two Companies could certainly be disregarded. He should allow nothing for prospective value. Some questions were put as to the work which the County Council had to do being already very heavy; but witness maintained that the Council would be able to successfully undertake the management of the concerns. Even if the interests of the outside authorities were antagonistic to those of the County Council, he still thought there would be less expenditure on parliamentary fights. He did not agree with Mr. Beachcroft in the statement that the staff of the County Council were absolutely overworked, nor that the work was enormously increasing.

Mr. PEMBER also cross-examined witness with a view to showing that it would seriously inconvenience the County Council to undertake the management of the eight Companies. Witness, however, held that they would be able to accomplish the work, which was no greater than that of the management of the County Council Asylums. The learned Counsel also put a number of questions relating to the table witness had put in tending to show that, as the Companies' dividends increased, so the cost of management increased. Witness denied making any charge of extravagance; saying the table was put in merely to illustrate the contention that, if a company had no direct interest in keeping down expenditure, they would not exert themselves to keep it down. He agreed that if a purchase were made of the eight Companies, and it were known that there was some £40,000,000 about to be invested in high-class securities, there might be some difference in the value of first-class securities generally. An arbitrator, however, would not have to consider this, because all the purchases would not take place at the same time.

By Mr. BAGGALLAY: The cost of management in the case of the New River Company, in 1896-7, according to his table, was £1247 per million gallons; but as the New River Company could divide unlimited dividends, whatever the amount it would not affect the public. This large expenditure might account in part for the fact that the Southwark and Vauxhall Company, whose corresponding figure was much less, supplied an average of 32½ gallons per head, against the 24½ gallons of the New River.

By Mr. RICKARDS: His figures as to the capital raised by the Chelsea Company from 1872 to 1897 were obtained chiefly from returns presented to the House, which, as appeared from the print itself, were compiled from information supplied by the Companies. Figures differing from those in the return were put to witness by Mr. Rickards, who said they were based on the Companies' accounts, which had been passed by the Local Government Board, and were therefore presumably correct. No solution of the difference in the two sets of figures was arrived at.

Witness having been very briefly re-examined by Mr. FREEMAN, the proceedings were adjourned till the 14th inst.

The tenth sitting of the Commission was held yesterday—Lord Llandaff presiding, and all the members, except Sir John Dorington, being present. Mr. G. L. Gomme, the Statistical Officer to the London County Council, examined by the Chairman, gave in detail particulars regarding the terms on which a number of provincial water undertakings had been acquired by local authorities; the first case dealt with being that of Glasgow.

THE EPIDEMIC OF TYPHOID FEVER AT MAIDSTONE.

The Local Government Board Inquiry.

The inquiry instituted by the Local Government Board into the circumstances attending the outbreak of typhoid fever at Maidstone, a summarized report of the first portion of which appeared in the "JOURNAL" last week, was resumed on Tuesday, before Mr. J. S. Davy, Mr. G. W. Willcocks, and Dr. Theodore Thomson. The Town Council were represented by Mr. J. F. Parker (Messrs. Sharpe, Parker, and Co.) and Mr. S. L. Monckton, the Deputy Town Clerk; and the Rural District Council, by Mr. Talbot. Mr. Dickens, Q C., and Mr. Hohler appeared for the Maidstone Water Company.

The first witness called was Mr. W. Jackling, the Sanitary Inspector of Maidstone, who gave evidence as to the sanitary improvements effected in the town during the last few years, especially in regard to the flushing and testing of drains. There were 75 wells still in use in the town; 38 had been condemned and closed during the last seven years. Whenever he suspected a well, he reported it, and had the water analyzed. When a well was condemned, it was always closed. There were within the drainage area of the town about 30 cesspools attached to houses that could not be drained into the sewers on account of the distance. About 3000 houses had closets unprovided with water. In his opinion, drainage had nothing to do with the outbreak; for the most insanitary parts of the town had escaped. Mr. S. L. Monckton, recalled, stated that certain old defective brick sewers had not been reconstructed, because the Local Government Board had refused to sanction a loan for the purpose so long as the present defective system of sewage disposal was continued. The town authorities had taken some steps towards adopting a new method, and were now contemplating the establishment of filter-beds on the biological system. Mr. M. A. Adams, the Medical Officer of Health, recalled, said he laid great stress on constant analysis of water, and also on inspection of gathering-grounds, which should be effectually protected against the possibility of contamination by human traffic, manure, or any other means. At present all the Farleigh sources were more or less open to risks. Mr. Percy Adams, recalled, put in various returns which had been asked for.

Some further evidence by medical men followed. Dr. H. E. Durham, of Cambridge, said he was at present specially engaged in studying the *coli bacillus*. He went to Maidstone on Oct. 19, and took samples from Tutsham-in-Field spring and from the Church spring. In the Tutsham sample he found both typical and atypical *coli bacilli* in considerable numbers. He should say it might be a good drinking water in the Soudan, but not in England. The other sample was a good water. The absence of *coli bacilli* in Dr. Woodhead's sample might be explained by the time which had elapsed before it was taken. Their presence indicated animal contamination. Mr. Jackson, Medical Superintendent of the asylum at Barming, said there had been 107 cases of typhoid there, including 19 attendants, with 11 deaths. Farleigh water had been distributed all over the building. They were now using Ewell water. The general sanitary condition of the asylum was good.

Mr. W. J. Ware, the Manager of the Water Company, was the next witness. He said the total Farleigh supply averaged 2,500,000 gallons a week. The Tutsham-in-Field spring yielded 5000 gallons a day; the Tutsham-in-Orchard spring, 1500 gallons; the Ewell spring, 190,000 gallons; and the other springs, about 100,000 gallons. The Tutsham water was cut off on Sept. 20; the South-Eastern Railway springs, on Sept. 25; and the whole of the Farleigh water, on Sept. 29.

The proceedings were resumed on Wednesday morning, when Mr. Dickens handed in a series of water analyses made in September; and Mr. Ware put in a description of the Company's works, which Mr. Davy intimated would be published in full in the Inspectors' report.

Mr. Ware then continued his evidence. He said he had never taken samples of water for analysis before last September. He visited the Tutsham sources on the 19th of that month with Mr. Percy Adams. He had last been to them a month or five weeks before; as he made a practice of visiting all sources of supply once a month. His visit in August took place previous to the arrival of the hoppers, and there was no sign of pollution of the ground. There was a great difference in the appearance of the place on the two visits. He had never suggested to his Directors, nor they to him, the propriety of taking steps to avoid surface pollution. The description given by Mr. Percy Adams of the ground and the catch-pit at Tutsham-in-Field was correct. He had not uncovered the catch-pit in 1897 before that occasion. It had not occurred to him to exclude hoppers and fruit-pickers from the Tutsham gathering ground. The collecting reservoirs or settling-tanks, through which the Farleigh water passed, were scrubbed out every month or three weeks. The last occasions before the outbreak were Aug. 5 and 6, and Aug. 25 and 26. The filter-beds were used only four or five times a year, when the water happened to show turbidity from very heavy rains. They had not been used last August, and were not used now. They were being reconstructed on a new system under the direction of Dr. Woodhead. The Barming service reservoir had not been cleaned out for about two years previous to the epidemic. It had been cleaned three times since he had been Manager. The Farleigh water was analyzed every three months by the Medical Officer of Health, and the Water Company relied on his analysis; they did not have an independent one. It was not possible to cut off the Farleigh water before Sept. 29, because a large quantity was

being used for flushing and other purposes. The Boarley and Cossington supplies were insufficient for domestic consumption and at the same time to keep enough storage in the reservoir to provide for fires. They were "between the devil and the deep sea;" and he decided to keep up a supply from such sources as he had every reason to believe were free from pollution—viz., the Ewell and Church springs. If he had cut off the supply when he received the letter from the Council urging this course, Maidstone would have been dry in 24 hours. Later they obtained assistance from the Mid-Kent Water Company; but, in order to get it, they had to lay a 5-inch main for a mile and a quarter. They had done everything that could be done. The sterilization of the mains was successfully carried out without any breakdown; but some of the highest districts had to be separately dealt with afterwards, on account of a fall in the pressure, due to all the taps being left open. No analysis of the separate springs was ever made, except when a new supply was added. A quarterly analysis was not enough; if it were weekly or bi-weekly, it would be a safeguard. No objection would be made by the Company to the Medical Officer of Health taking samples from the springs for analysis.

Replying to questions put by Mr. Davy, the witness said the collecting-pipes at Tutsham were open-jointed earthenware ones placed about 3 feet below the surface of the ground. He was quite certain that the Farleigh pumping-station furnished no water but that derived from the springs. The conduit through which the water passed when the filters were in use was not water-tight. Some old springs entered it; but it was seldom used. The Farleigh supply was about 3 million gallons a week; that from the other sources, about 5 million gallons.

Mr. Ware was followed by the Company's Secretary, Mr. C. A. Case, who specified the Acts of Parliament under which the works had been carried out. He stated that in 1860 two alternative schemes for obtaining water from Cossington and another chalk source were thrown out by Parliament. In 1896 the ratepayers of Maidstone rejected, by a large majority, a proposal to take over the water supply.

The next witness was Dr. W. H. Corfield, Professor of Hygiene at University College, and Medical Officer of Health for St. George's, Hanover Square. He said he had made a special study of typhoid fever for about thirty years. It was often communicated by water and milk, but, in his experience, also very frequently by foul air containing excremental pollution. He believed it could be spread in epidemic form by this means. In his opinion, the state of the drainage at Maidstone, which had been described, would be sufficient to cause the epidemic; and he was confirmed in this view by the fact that nearly one-fifth of the cases had occurred after the water supply had been cut off. He considered that the chemical analysis of the Tutsham water did not indicate sewage pollution. There was surface pollution of some kind, no doubt; but he should say it was some vegetable matter that had got in. The sample taken "from all sources" on Sept. 20 indicated a remarkably pure water. In cross-examination, Dr. Corfield acknowledged that typhoid fever was more often spread by water than by sewer air. In answer to Dr. Thomson, he said he had not formed any judgment as to the cause of the epidemic. It was a very difficult case.

This closed the evidence.

Mr. Dickens then addressed the Inspectors on behalf of the Water Company. He said the epidemic had caused great anxiety to the Directors, who had done everything in their power to cut it short. They did not ask for the inquiry, but they had offered every assistance in giving information; and they did not regret that it had been held, as many matters not previously understood had been made clear. The Company had met with great difficulties in supplying the town with water since they began to do so in 1860. The Farleigh springs had served them very well for many years; and the result of Mr. Adams's examinations was to show an increasing purity year by year. This went on down to the analysis made on June 29, 1897. Then the epidemic arose, which, he contended, no mortal could have foreseen. Assuming that the water was at fault, nothing more could have been done than the Company had accomplished. It was suggested that more frequent analyses of the water should have been made; but its past history showed them to be unnecessary and useless. During the epidemic, the Directors gave every assistance to the authorities, and made every effort, not only to stop the disease, but to discover its cause. The suspected water was cut off at the first intimation, and the rest as early as practicable. It had been suggested that the catch-pits should be protected; but the question was how far this should be extended. He maintained they were protected as much as possible. With regard to the rise and spread of the epidemic, he demurred to the suggestion that the water had been proved to be at fault. He did not venture to make any affirmative proposition; but he submitted that it was a very troublesome question to decide. There were difficulties on both sides. Some things pointed to the water; but, on the other hand, there was the grossly insanitary condition of the town, the continuance of the disease after the water was cut off, and the immunity of the cottagers at Tutsham, who drank the water. Many facts favoured the theory that the trouble arose from the drains. It was clear that the hop-pickers could have had nothing to do with it, as they did not arrive until after the outbreak had begun. The relative distribution of cases was in accord with the drain theory. Most of them occurred in the area of the Farleigh supply, which was on the highest ground, and therefore most exposed to pressure of gas from sewers; then came the Boarley area, next in situation and in number of cases; and lastly the Cossington area, which lay lowest, and had the fewest cases. The occurrence of 357 cases after the water had been cut off was incompatible with the water theory, but quite in keeping with that of defective drainage. He begged the Inspectors to keep an open mind, and to ask themselves if the evidence was sufficient to condemn the water as the cause of the epidemic.

On the resumption of the inquiry on Thursday, Mr. Howlett addressed the Inspectors on behalf of the County Asylum at Barming. He said the Water Company were under contract to provide the asylum with "good and wholesome" water. It was supplied from Farleigh; and he contended that this water was the cause of the outbreak in the asylum. He suggested that the reservoirs might be contaminated by percolation; and he pointed out that the Company had not kept up any analysis.

Mr. Howlett was followed by Mr. F. R. Parker, who explained the position of the Council with reference to the inquiry. He said they had asked for it under a misapprehension, and might have withdrawn; but they preferred to give such assistance as they could. He protested against the assumption that there was a preconceived opinion against the water supply. With regard to drainage, the Corporation were responsible for the sewers, but not for the house drains. He contended that all the evidence had shown that the water alone was responsible. As soon as it was cut off the epidemic subsided. The analysis of the water, the admitted pollution of the ground, and its peculiar condition on account of the drought, all pointed to the same conclusion. The theory of sewer air was incompatible with the character of the outbreak; and Professor Corfield, who was called to put it forward, did not venture to attribute the epidemic affirmatively to this cause. With regard to the failure to analyze the water, he submitted that no duty rested on the Corporation to do this, and moreover they possessed no power to do it. If the Medical Officer of Health visited the springs to take a sample, he was trespassing, and taking that which did not belong to him. As for the sewers, he admitted defects, but maintained that ventilation was carried out as well as it could be, and that insufficiency had nothing to do with the inquiry, as it was not the cause of the outbreak. Blocked house drains and unflushed closets were more important; but he submitted that the Sanitary Authority were not entitled to order a householder to adopt a mechanical means of flushing, and pointed to the steady improvements that had been effected. In conclusion, he asked that the costs incurred by the Council in relation to the inquiry might be ordered by the Local Government Board to be borne by the Company, on the ground that it was really an inquiry into the condition of the water supply. Failing this order, he made a second application that the costs might be borne by the Consolidated Fund, on the ground that the inquiry had been held for the benefit of the country at large. If neither order was granted, he asked that the costs might be charged to the district fund.

In closing the inquiry, Mr. Davy said he wished to state, on behalf of his colleagues and himself, that they had received the greatest assistance and help from everyone concerned. But for this their task would have been much more difficult. He hoped the result of the inquiry would be the removal of many apprehensions, and the establishment of a better feeling in Maidstone.

THE OUTBREAK OF TYPHOID FEVER AT KING'S LYNN.

Report of the Local Government Board Inspector.

In reviewing the events of the past year, in connection with water supply, in the "JOURNAL" for the 28th of December last, we referred to a deplorable outbreak of typhoid fever which had occurred at King's Lynn. It was in the village of Gaywood, which is a continuation of the borough, that the epidemic first showed itself on the 28th of October; and within five days no fewer than 114 persons were attacked. The Local Government Board thereupon instructed one of their Medical Inspectors—Dr. F. St. George Mivart—to inquire into the subject; and his report has lately been issued.

It appears that a similar epidemic occurred in 1892, and Dr. Bruce Low, a Medical Inspector of the Local Government Board, reported that between January and June 135 recognized cases of enteric fever were noted, with 15 deaths, and that the fever had undoubtedly been disseminated by means of the King's Lynn public water service, which was common to the town and to the neighbouring village of Gaywood. He advised that, until a pure supply had been obtained, the inhabitants should boil the water before using it for drinking purposes. Since the date of that report King's Lynn and Gaywood have in no year been free from enteric fever; but, up to the end of August last, Lynn and its suburb suffered no more than the customary amount of enteric fever. But, during successive fortnights of September, and early in October, the disease became twice to three times as prevalent as in any previous month of the year. Then occurred an extraordinary outbreak. Dr. Mivart says: "In the fortnight ending Oct. 26, fever in Lynn and Gaywood increased from thirty to forty fold, and maintained during the next succeeding fortnight a nearly equal degree of prevalence. Afterwards it quickly declined; so that by the beginning of December the epidemic as such was practically at an end. In all, there occurred in Lynn and its neighbourhood between Sept. 1 and Nov. 30, 453 cases and 44 deaths referred to enteric fever—an attack-rate by the disease of 23·45, and a death-rate of 2·28 per 1000 of the census population." Not less remarkable than the suddenness of the epidemic was the general distribution of the fever.

As to the cause of the epidemic, Dr. Mivart did not act upon the strong presumption that it was due to the faulty character of the public water service, preferring rather to examine, as matter of first instance, other accredited agents of enteric fever. Accepting the description of the sewerage of Lynn which Dr. Bruce Low gave in 1892 as representing to a very large extent the present condition of the town, Dr. Mivart comes to the conclusion that faulty sewerage and drainage were not responsible for the sudden outburst of enteric fever last year; and a very brief inquiry was sufficient to set aside the suggestion that milk had been the means of conveying the disease. As to the relation of the water to the epidemic, the town supply is still, as it was at the time of the visit of Dr. Bruce Low, obtained from the Gaywood River. The head waters of the stream are derived from springs, several of the principal sets of which rise amid foul surroundings. Dr. Bruce Low described the various pollutions which reach the Gaywood River in its course from these springs to within about a mile of the intake at Gaywood; and Dr. Mivart discovered that the condition of affairs in this respect remained last year as it was in 1892. Fæcal matters were being washed out into the stream at seasons of heavy rain; and the earthenware pipes at the intake of the water-works were leaking so freely at the joints that, when an inspection was made, a pump had to be employed to get rid of the escaping water. The pipes are not bedded in concrete, but lie in clay, covered by thick heavily-manured garden mould.

It thus appears that the water furnished to the inhabitants of the town has now, as at the date of Dr. Bruce Low's report, "multifarious opportunities for becoming polluted by human excrement, not to speak of other impurities directly discharged into it, or washed into the streams by heavy rains or melting snow." The opportunities referred to were afforded—first, at the source of the river; secondly, in its course to the intake; and,

thirdly, at the water-works, where the so-called filter-beds were really only straining-tanks. Dr. Mivart states that, as was inevitable in the circumstances, the quality of the Gaywood River water has again and again been called in question. Chemical testimony, when appealed to, has been almost uniformly hostile to the water, which had been described as unfit for drinking purposes; while local medical opinion long since utterly condemned it. Nevertheless, "incredible as it might appear, a large and influential section of the inhabitants of Lynn maintain, or, at any rate, have maintained until now, that their water, manifestly polluted though it be, is of excellent quality."

As on the occasion of the prevalence of fever in 1892, so in 1897 epidemic enteric fever was preceded—at an interval corresponding to the incubation period of the disease—by exceptional meteorological conditions, causing sudden flood in the Gaywood River. Twice previous to the epidemic, and within the space of a few weeks, the local water-works, which are owned by the town, were delivering to the inhabitants of Lynn and Gaywood water suddenly and dangerously befouled.

Dr. Mivart concludes his report by explaining the various measures which he recommended to the Local Authority on his arrival at King's Lynn; and he says that by adopting such precautions "the best was perhaps done in the circumstances to mitigate disaster that should never have occurred." He endorses the opinion expressed by Dr. Bruce Low in 1892—that, so long as the supply of drinking water for the borough is derived from the Gaywood River, so long will the borough be at the mercy of water-borne disease. "Ever since 1876 the more thoughtful section of the inhabitants have," he says, "been engaged in a struggle, the bitterness of which only those resident on the spot can realize, to obtain for themselves and their families a wholesome supply of drinking water. In 1875, Mr. Hawksley, being consulted by the Town Council, recommended that the water should be brought in pipes from one of the springs direct to the town. Since then, until recently, in vain have Medical Officers of Health and Engineers and Surveyors protested, and experts like Mr. Whitaker, F.R.S., and Mr. Mansergh, M.Inst.C.E., reported and advised. The party with whom no argument but the one as to the cost had any weight were too strong. It might certainly be thought that after the severe outbreak in 1892, which was traced in the clearest manner by Dr. Bruce Low to the infection of the public water supply, all opposition to a new source would cease. But such was not the case. In the end, however, a Provisional Order of the Local Government Board enabled the Town Council to carry out a scheme which might otherwise have been frustrated by the opposing section of the inhabitants." The works in connection with the new scheme for bringing water from deep wells in the chalk near Grimstone are being actively pushed forward; but Dr. Mivart was told that it will be six or eight months before they are completed.

Deal and Walmer Water-Works Purchase.—The Deal and Walmer Joint Water Board have accepted a tender for a loan of £63,800 at 3 per cent.—repayable £51,000 by half-yearly instalments of principal and interest in fifty years, and the balance in ten years—for the purchase of the local water-works.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

We live in an age of grandmotherly legislation—a condition of the State which is chiefly responsible for the letting loose of a horde of inspectors over the length and breadth of the land. Of the disposition of these gentlemen to ride on top of their commission few are unaware. The other day I learned of the sanitary inspector of one of the leading counties in Scotland insisting upon the owners of a row of cottages by a roadside covering in a stream which flowed along the far side of the road. The water in the stream is as clear as crystal; and there was less reason for covering it in than there would be for making the Clyde, the Forth, or the Tay underground sewers, for there was no sewage in the stream, whereas those rivers are largely polluted. I have heard, too, of a sanitary inspector who objected to a stable because it had no window, and the horses would be unable to see to eat their food. These remarks lead me to the subject I have in view, which is the annual report of Dr. Simpson, the Medical Officer of Health for the Burgh of Perth. This report was submitted to the Local Authority in committee on Thursday night. In it the Doctor states that he finds the death-rate in the city during the past year was at the rate of 22 per 1000 of the population; whereas the average for the preceding seven years was 20·4. In seeking for an explanation of this high death-rate, he surmises that the population was probably underestimated at the last census—an extraordinary suggestion, because at the census the population is not estimated, it is numbered, and with very great strictness too. Then he puts forward the idea that the nature of the population may have had something to do with it; so many young people quitting the place in search of employment, and leaving only the aged behind—a suggestion which was surely made without much reflection, because the same cause would operate in the seven preceding years as well as last year. Then they had slums, poverty, and destitution. But these, again, could not be peculiar to last year. Lastly, "seemingly a new source of ill-health had arisen through the filthy gas." On this point, I give the Doctor's remarks in full. He said "there probably never had been a more widespread and general complaint about anything, nor with greater reason, than there had been about the quality of the Perth gas. The smell that emanated from it on burning, alike in private houses and in factories, had been simply abominable. That it had been a nuisance, not only dangerous, but actually injurious, to health all over the town for the whole year, had been abundantly proved by the prevalence of sick headaches and other evidences of loss of health caused by it. In his last report, he mentioned that the gas washings had a fearful smell; but whether it was that there were no gas washings now, or whether it was that the bad gas was engaging so much attention, little was heard of them now. Whatever was the cause of this mattered little; whether it was imperfect washing of the gas, or forcing it through retorts, or imperfectly made, or made from bad stuff, it was disgraceful that any local authority should attempt to make a revenue out of the sale and distribution of such a poisonous and deleterious substance; and the wonder was that the people had borne with it so long.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 336.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 14	10½	Alliance & Dublin	10 p. c.	25—26	..	4 0 9
100,000	10	,,	7½	Do.	7 p. c.	16½—17½	..	4 5 8
300,000	100	Jan. 3	5	Australian	5 p. c. Db.	105—107	..	4 13 6
200,000	5	Nov. 11	6½	Bombay, Ltd.		6½—7½	..	4 9 7
40,000	5	,,	6½	Do.	New, £4 paid	5—5½	..	4 14 6
380,000	Stk.	Aug. 27	12	Brentford Consolidated		300—305	..	3 18 8
240,000	9		9	Do.	New	227—232	..	3 17 7
50,000	,,	,,	5	Do.	5 p. c. Prf.	145—150	..	3 6 8
159,375	,,	Dec. 15	4	Do.	4 p. c. Db. Stk.	134—138	..	2 18 0
220,000	Stk.	Sep. 15	11½	Brighton & Hove Orig.		275—280	..	4 2 3
208,820	,,	,,	8½	Do.	A. Ord. Stk.	200—205	..	4 2 11
933,500	Stk.	Aug. 27	5	Bristol, 5 p. c. max.		130—135	..	3 14 1
420,000	20	Sep. 30	11½	British		56¾—57½	..	3 18 3
50,000	10	Aug. 27	11½	Bromley, Ord.	10 p. c.	25—27	..	4 5 2
71,000	10	,,	8½	Do.	7 p. c.	20—22	..	3 17 3
500,000	10	Oct. 14	6	Buenos Ayres (New) Ltd		9½—10½	..	5 17 1
98,122	Stk.	Dec. 30	4	Do.	4 p. c. Db. Stk.	97—99	..	4 0 10
150,000	20	July 15	8¼	Cagliari, Ltd.		30—32	..	5 3 1
100,000	10	Sep. 30	8	Cape Town & Dis., Ltd.		17—18	..	4 8 11
50,000	50	Nov. 2	6	Do.	6 p. c. 1st Mort.	59—61	..	4 18 5
550,000	Stk.	Oct 14	13½	Commercial Old Stock		340—345	..	3 18 3
200,750	,,	,,	10½	Do.	New do.	255—260	..	4 0 9
200,750	,,	Dec. 15	4½	Do.	4½ p. c. Db. do.	154—157	..	2 17 4
800,000	Stk.	Dec. 15	12	Continental Union, Ltd.		249—254	−1	4 14 6
200,000	,,	,,	9	Do.	7 p. c. Prf.	214—219	..	4 2 2
51,600	Stk	Aug. 27	14	Croydon A	10 p. c.	315—320	..	4 7 6
163,400	,,	,,	11	Do.	B 7 p. c.	252—257	..	4 5 7
535,000	Stk.	Aug. 12	5½	Crystal Palace Ord.	5 p. c.	137—140	..	3 15 0
60,000	,,	,,	5	Do.	5 p. c. Prf.	140—143	..	3 9 11
486,090	10	Jan. 27	11	European, Ltd.		25¼—26¼	..	4 3 0
354,060	10	,,	11	Do.	£7 10s. paid	18—19	..	4 6 0
5,922,110	Stk.	Feb. 10	12¾	Gaslight & Coke, A, Ord.		300—305*	−5	4 3 8
100,000	,,	,,	4	Do.	B, 4 p. c. max.	112—117*	−1	3 8 5
665,000	,,	,,	10	Do.	C, D, E, 10 p. c. Prf.	317—322*	−3	3 2 1
30,000	,,	,,	5	Do.	F, 5 p. c. Prf.	150—155*	..	3 4 6
60,000	,,	,,	7½	Do.	G, 7½ p. c. do.	220—225*	−2	3 6 8
1,300,000	,,	,,	7	Do.	H, 7 p. c. max.	201—206*	−3	3 9 0
463,000	,,	,,	10	Do.	J, 10 p. c. Prf.	316—321*	−3	3 2 4
476,000	,,	,,	6	Do.	K, 6 p. c. Prf.	185—190*	−2	3 3 2
1,061,150	,,	Dec. 15	4	Do.	4 p. c. Db. Stk.	138—141	..	2 16 9
294,850	,,	,,	4½	Do.	4½ p. c. do.	156—159	..	2 6 7
958,000	,,	,,	6	Do.	6 p. c. do.	205—210	..	2 17 1
70,000	10	Oct. 28	8	Hongkong & China, Ltd.		14—15	..	5 6 8
3,800,000	Stk.	Nov. 11	10	Imperial Continental		220—225	+1	4 8 11
376,400	100	Feb. 1	4	Do.	4 p. c. Dbs. Red.	98—101	..	3 19 3
473,600	Stk.	Feb. 10	3½	Do.	3½ p. c. Db. Stk.	103—105*	−2	3 6 8
				* Ex div.			

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
75,000	5	Dec. 15	6	Malta & Medn., Ltd.		5½—6	..	5 0 0
560,000	10†	Oct. 1	5	Met. of Mel- bourne	5 p. c. Db. 4½ p.c. Db.	112—114	..	4 7 8
250,000	100	,,	4½			109—111	..	4 1 1
541,920	20	Nov. 11	5	Monte Video, Ltd.		15—16	..	6 5 0
150,000	5	Nov. 26	8	Oriental, Ltd.		8½—8¾	..	4 11 5
135,000	5	,,	8	Do.	New, £4 10s. pd.	7—7½	..	4 16 0
15,000	5	,,	8	Do.	do. 1879, £1 pd.	1½—2	..	4 0 0
60,000	5	Sep. 30	7	Ottoman, Ltd.		4¾—5½	..	6 13 4
420,000	100	Nov. 2	6	People's Gas of Chicago	1st M. Bd. 2nd do.	104—109	..	5 10 1
500,000	100	Dec. 1	6			103—108	..	5 11 1
250,000	10	Sep. 30	10	San Paulo, Ltd.		16—17	..	5 17 3
135,000	Stk.	—	10	Sheffield A.		250—253	..	3 19 0
309,053	,,	—	10	Do.	B.	250—253	..	3 19 0
447,427	,,	—	10	Do.	C.	250—253	..	3 19 0
5,475,000	Stk.	Aug. 12	5½	South Metrop., 4 p.c Ord		146—149	+1	3 10 6
1,416,667	,,	Jan. 13	3	Do.	3 p. c. Db. Stk.	105—108	..	2 15 7
60,000	Stk.	Sep. 15	12	Tottenham and Edmonton	A. B.	285—295	..	4 1 4
60,000	,,	,,	9			205—215	..	4 3 9
182,380	10	Dec. £0	7	Tuscan, Ltd.		13½—14½	..	4 16 7
149,900	10	Jan. 3	5	Do.	5 p. c. Dbs. Red.	100—103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	Dec. 30	10½	Chelsea, Ord.		335—340	..	3 1 9
150,000	,,	,,	5	Do.	5 p. c. Prf.	177—180	..	2 15 6
160,000	,,	,,	4½	Do.	4½ p.c. Pf. Stk., 1875	157—160	..	2 16 3
175,785	,,	Sep. 30	4½	Do.	4½ p. c. 1 b. Stk.	160—165	..	2 14 6
1,720,560	Stk.	Oct. 14	7½	East London, Ord.		233—237	..	3 3 3
654,740	,,	Dec. 30	4½	Do.	4½ p. c. Db. Stk.	162—165	..	2 14 6
390,000	,,	,,	3	Do.	3 p. c. Db. Stk..	105—107	..	2 16 1
700,000	50	Dec. 15	7½	G'd Junct'n, 10 p. c. max.		122—127	..	2 19 0
295,000	£tk.	,,	4	Do.	4 p. c. Db. Stk.	147—150	..	3 12 8
708,000	Stk.	Feb. 10	13	Kent		357—363*	−5	3 11 10
160,000	,,	,,	7	Do.	New, 7 p. c. max..	213—218*	−2	3 4 3
1,043,800	100	Dec. 30	10	Lambeth, 10 p. c. max.		307—312	..	3 4 1
406,200	100	,,	7½	Do.	7½ p. c. max.	230—235	+3	3 3 10
350,000	Stk.	Sep. 30	4	Do.	4 p. c. Db. Stk.	147—150	..	2 13 4
500,000	100	Feb. 10	13	New River, New Shares		447—452*	−5	2 17 6
1,000,000	Stk.	Jan. 27	4	Do.	4 p. c. Db. Stk.	151—154	..	2 11 11
902,300	Stk.	Dec. 15	6	Southw'k & V'xhall, Ord.		166—169	..	3 11 0
126,500	100	,,	6	Do.	do. 7½ p. c. max.	162—167	+2	4 9 10
489,200	Stk.	,,	5	Do.	do. 5 p. c. Prf.	175—180	..	3 15 6
1,019,585	,,	Oct. 14	4	Do.	4 p. c. A Db. Stk.	147—150	..	2 13 4
1,155,056	Stk.	Dec. 15	10	West Middlesex		317—322	..	3 2 1
200,000	,,	,,	4½	Do.	4½ p. c. Db. Stk.	163—166	..	2 14 3
				* Ex div.			

There was a man who came every other day and removed the water from the main-pipe in Marshall Place; and the stench was a veritable gas-works in itself to a great distance round about. Though people were paying even more than they did before for their gas, the light emitted was of the most feeble kind, and reminded one of the old days of the whale-oil lamp or the crude tallow candle." Now, letting alone the concluding expression about the illuminating power of the gas, which, to say the least, does not come within the province of a Medical Officer of Health, I feel disposed to say that this gentleman makes too much of the condition of the gas supplied in Perth. The Gas Commissioners and their Manager (Mr. A. Wilson) do not seek to conceal their dissatisfaction with the gas, which, for want of accommodation, they have been unable to purify properly; and they are doing the very best they can to remove the drawback by proceeding with the erection of new works. Then why go on harping upon the bad quality of the gas, as if the thing were done maliciously? But to go further, what sort of a report was this from a medical officer? He takes the prevalence of sick headaches as proof that the gas was injurious to health. He does not say that he analyzed the gas, or the atmosphere in factories, or dwellings, and found in it anything which was deleterious. There might have been other causes than impure gas. Suppose a new cheap article of diet had been pushed in the town by some of the traders, might not sick headaches be accounted for in that way? Or suppose some new chemical were introduced into the working of the dye-works, which are the staple industry in Perth; or suppose, further, that the water supply had become contaminated; or, still further, that the sewage system was bad. Most manifestly the Medical Officer has not only not exhausted all the possible sources of affection, but in the case of the one which he seeks to make responsible he has approached it rather with a petulant than a scientific mind. I almost wish I could hear him put under cross-examination by clever Counsel as to his report. I rather think it would be torn to tatters in no time. Short of this, I should like very much to see the Gas Commission take him to task upon it, and ask him to give some reasons for his belief that it was the gas, and not some other cause, which led to sickness among the people.

The Glasgow Corporation Gas Committee are at present considering how they may increase the demand for gas for use in cooking-stoves and fires. They have been contemplating such methods as the reduction of the hire for range-fittings from 6s. to 4s. per annum; the introduction of a smaller cooker for workmen's houses, which would not cost more than 2s. per annum; the more widely advertising of their business in that line; and the holding of exhibitions and cookery demonstrations in all the districts of the city. They might safely adopt all these. But Glasgow has less need than any other place in Scotland to push this particular line of business, for it is already very large, which, I suppose, is due to the low price of the gas. That is the most important factor of all in promoting the practice of cooking and heating by gas.

To meet next winter's demand for gas, the Committee have resolved to add two new exhausters, one new set of condensers, and two new station meters to the plant at Dawsholm; and they have also decided to proceed with the extension of the purifier-house. Contracts for the purifiers have been let. The excavations, brickwork, &c., have been placed in the hands of Messrs. John Paterson and Sons, Limited, of Glasgow, at the price of £1702; and the ironwork, with the Barrowfield Iron-Works, Limited, of Glasgow, at the price of £4950. For all this plant there is provision made in the laying out of the works. As, however, the last section of retorts which can be put into the works is at present in hand, there cannot be much further extension of the plant in Dawsholm. But there is room for additions, more particularly in the retorting department, in the Temple works adjoining.

The Corporation of Glasgow have resolved to make an experiment with the trolley-wire system of electrical haulage for tramcars. They have selected the Springburn route, in the north of the city, for the line. The Gas Committee are afraid that the heavy currents which are to be used may lead to the damaging of their mains by electrolysis; and they have remitted to the Convener (Mr. R M. Mitchell), Bailie Fife, and the Engineer (Mr. W. Foulis), to inquire and report on the subject.

The Police Commissioners of Monifieth are feeling sore over the rejection by the ratepayers of the proposal to build a gas-works under the Burghs Gas Supply Act. At their meeting on Tuesday night, the result of the poll was reported. The expenditure connected with it amounted to £47 16s. 4d., which is a considerable item in such a small place. The Convener of the Lighting Committee said they would now be obliged to light the streets as best they could, and he would submit a scheme at their next meeting. Bailie Robertson blamed the ratepayers who did not vote for the result of the poll, and thought they had not yet got the voice of the ratepayers upon the subject. Provost Stewart said he used to pride himself on representing an intelligent and progressive community. This opinion was now considerably modified. The Commissioners had nothing to boast of in this respect, when they remembered that they were serving electors who voted one way in September and another in January. They were probably not singular, as small communities generally made a mess of it when such important matters as lighting and water came up for decision. He would not be surprised to see a private gas company started. He did not think such a company would be difficult to float; nor would it be very hard to demonstrate that the company could make and sell gas at the price at which the Commission had promised to supply it.

The Police Commissioners of Troon, having adopted the Burghs Gas Supply Act, have this week taken the first step to put it into force. A special meeting of the body was held, at which Provost Logan moved that the Commissioners give notice to the Troon Gaslight Company that they are willing to treat for the purchase of the undertaking, in terms of the provisions of sections 20 and 21 of the Act. The Statute gives the Gas Company two months to reply to this notice. The Police Commissioners have gone about the matter strictly according to form, which is as it should be, but they also deserve credit—and the entire community of Troon may be included in the compliment—for the fact that not once during the whole of the proceedings down to the present time, has a single word been said which was derogatory to the Gas Company. The business has been entered upon as a commercial one; and no feeling or sentiment has been introduced. How different this is from the usual preliminary steps in a transfer. It lies now with the parties to come to terms; or, if they cannot, to proceed to arbitration to fix the value of the undertaking. I do not

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

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The above Company have erected during the last four-and-a-half years, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

ENGLAND.

	Daily Capacity. Cubic Feet.		Daily Capacity Cubic Feet.
BLACKBURN	1,250,000	SALTLEY WORKS, BIRMINGHAM (Second Contract)	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000	HALIFAX	1,000,000
COLCHESTER	300,000		
BIRKENHEAD	2,250,000		
SWINDON (New Swindon Gas Company)	120,000		

AMERICA.

TORONTO	One New Set.
OTTAWA	One New Set.
TORONTO	(Second Contract) Improving Four Double Superheater Settings.
LINDSAY	Re-modelling Plant.
MONTREAL	Two New Sets and other parts of Plant.
BELLEVILLE	One "Springer" Setting Re-modelled with M-W-P. Patents.
OTTAWA	(Second Contract) One New Set.
BRANTFORD	Additional Improvements to Existing Setting.
ST. CATHERINES	Additional Improvements to Existing Setting.
KINGSTON, PA.	One New Set and other Parts of Works, including New Purifiers and Gasholder.
PETERBOROUGH	One Set and Re-modelling Works.
WILKESBARRE, PA.	Two New Sets and other parts of Plant.
ST. CATHERINES	(Second Contract) One New Set.
BRANTFORD	(Second Contract) One New Gasholder.
BUFFALO, N.Y.	1,500,000 Cubic Feet Daily Capacity.

know what the proposals of the Police Commissioners are, or who are their advisers; but the experience hitherto, I think, warrants me in expecting that, should they go to arbitration—which, after Stirling, I look upon as the safest course for both parties—the proceedings will be conducted in not only a reasonable, but a gentlemanly manner.

The long and costly litigations between the Clippens Oil Company and the Edinburgh and District Water Trustees, regarding the minerals under the Trustees' pipe-track in the Oil Company's lands at Pentland, have come to an end so far as the Scotch Court is concerned. It is now two months since the Court decided that the Trustees had acted wrongly in laying a main-pipe along a public road, and ordered them to lift it. This matter is under appeal to the House of Lords. The other case, in which the Trustees sought to interdict the Company from working out shale and limestone stoops, or supports, from below the pipe-track or within forty yards of it, was disposed of in the First Division of the Court of Session on Thursday of last week. In the Outer House, Lord Pearson had refused to interdict the working of shale, on the ground that the working out of shale stoops was a usual proceeding; but he interdicted the working out of the limestone, for which he could find no precedent. Both parties acquiesced in the decision so far as it regarded the shale; but the Oil Company took the case to the Inner House on the question of the working out of the limestone. They have been entirely successful. The opinions of the Judges are highly legal; but put into plain language, they amount to this, that the working out of subterranean limestone, though not extensively practised, was quite in keeping with the working out of other minerals, and must therefore be held to be a usual practice, and that the remedy of the Water Trustees amounted to no more than the obtaining of interdict and damages if wilful damage were done to their pipes. This decision places the Water Trustees altogether in the wrong, on every point raised. Their action has led to the virtual stoppage of the Oil Company's works, for which, it is understood, a claim for compensation is to be made.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 12.

Sulphate of Ammonia.—There has again been a quiet market; and prices have been barely maintained—closing quotations being £10 to £10 2s. 6d. per ton, delivered f.o.b. at the ports. Early in the week, there were re-sales down to £10 per ton f.o.b. Leith; but, a large export order having been placed there, an improved tone has supervened, and £10 2s. 6d. per ton is again the quotation. Elsewhere there has been no special feature. Any "covering" that has to be done for February is being postponed; and, although there has been a fair amount of direct buying, consumers are still indulging the hope of getting in at lower prices later. It is satisfactory to observe that January shipments were on about the same scale as those in January, 1897; and, current production only having been available, there were no stocks to bring forward into February. Hence makers have not been under any necessity for pressing sales; and, notwithstanding the only moderate demand, the decline in values on the fortnight has not been more than 2s. 6d. to 3s. 9d. per ton. The forward position has been neglected; and no business of importance has transpired.

Nitrate of Soda is quiet; and, owing to arrivals, fine quality has been selling at 7s. 6d. per cwt.

LONDON, *Feb.* 12.

Tar Products.—Benzols are fairly steady, with a slight tendency to improvement. The advent of a large quantity of crude benzol coke-oven naphtha has somewhat damaged the position of the market. A large business has been done in this product, 30 per cent. quality, casks included, at 8d. per gallon, which would leave the naked value of the naphtha less than 7d. Tar distillers are asking ¼d. per gallon more. Carbolic acid is stronger, this product evidently being scarce; and producers are asking 1d. more than is quoted below, which is the price named by buyers. Large shipments of pitch are now being made; and the improved price noted last week is maintained. The large production of carburetted water gas, which has taken place at many gas-works during the past season, has materially lessened the production of tar; and the output of pitch will be far less than was estimated. The recognition of this is undoubtedly making itself felt in the market value of that article. Both solvent and heavy naphthas are in good request, and, singularly, continue to be more valuable than benzol. Creosote continues scarce, with eager buyers. The output of this product also will be much less than in former years. Only a moderate business is being done in heavy oils; and prices are not so firm.

Business during the past week may be averaged at the following rates: Tar, 12s. to 16s. Pitch, east coast, 18s. to 19s.; west coast, 15s. to 16s. 6d. Benzols, 90's, 1s. 3d.; 50's, 1s. 5½d. Toluol, 1s. 7½d.; pure, 1s. 10½d. Solvent naphtha, 1s. 6d. Heavy naphtha, 1s. 3d. Crude, 30 per cent., naphtha, 7d. Creosote, 2d.; liquid, 2½d. Heavy oils, 37s. 6d. to 45s. Carbolic acid, 60's, 2s. Pressed naphthalene, 50s.; salts, 27s. 6d. Anthracene, "A," 5½d.; "B," 4½d.

Sulphate of Ammonia.—A clerical error crept into last week's report in reference to the price, which should have read £10 2s. 6d. to £10 5s.—not £10 15s. Buyers are not so urgent; and there is therefore a quieter market. But makers are very heavily sold; and there is not much sulphate offering at the moment. There is likely to be a very much larger home demand than in previous years; sulphate having been most successfully applied during the past two seasons, in Great Britain. To-day's value is about £10 2s. 6d., less 3½ per cent. at all ports.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—There is still very little movement to report in the coal trade of this district. The better qualities, though helped slightly by the weather, continue only in very slow request for the time of the year, and collieries generally are not doing more than move off

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their output. Surplus lots under load are pushed for sale occasionally at low figures, for prompt clearance; but list rates are without quotable change. Best Arley still averages 10s. 6d. to 11s. per ton at the pit; Pemberton four-feet and seconds Arley, 8s. 6d. to 9s.; and common house coal, 7s. to 7s. 6d. All other descriptions of fuel for iron-making, steam, and general manufacturing purposes are moving off tolerably well. Steam and forge coals are in fair request, and firm at about 6s. 6d. per ton as the minimum for ordinary qualities at the pit mouth. Some of the better qualities of engine fuel are scarce in the market, owing to the restricted demand upon house coal; but with inferior sorts plentiful, consumers have no difficulty in covering requirements. Prices are not more than steady at late rates; averaging 3s. to 3s. 6d. per ton at the pit for common, 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 5s. for best sorts. The shipping trade is moderately active, with good steam coal averaging 8s. 3d. to 8s. 6d. per ton delivered at the Mersey ports.

Northern Coal Trade.—The coal trade of this district is decidedly easier, though there has been a very heavy shipment, especially of gas coals to the South. Best Northumbrian steam coals are quiet at about 8s. per ton f.o.b.; second-class steam are 7s. 9d.; and steam smalls, 3s. There is a little fuller demand for manufacturing coals. In regard to the gas coal trade, there is a diminished use, as is natural with the lengthening days; but the collieries have still full work. The price of best Durham gas coals is from 7s. 6d. to 7s. 9d. per ton f.o.b.; and it is expected that two contracts now in treaty for Sweden will be ultimately settled at a rate equal to the first figure. Gas coke shows no change this week; but stocks are heavy at some of the works inland.

Scotch Coal Trade.—Trade continues to be steady, and of good volume, with very little difference as regards prices. Owing to the very mild weather which has been experienced during nearly the whole winter, there has been a small demand for coal for domestic purposes; and now large quantities which would have been consumed in dwelling-houses are being offered for shipment. In this way prices do not spring so much as might have been expected. The Miners' Federation have instructed district secretaries to make a demand of an advance of 6d. per day in the men's wages. It is expected that the request will not be granted. The prices quoted are: Main, 6s. 6d. to 6s. 9d. per ton f.o.b. Glasgow; ell, 7s. to 7s. 3d.; and splint, 7s. 3d. to 7s. 6d. The shipments for the week amounted to 117,449 tons—a decrease of 35,265 tons on the preceding week, and of 24,913 tons on the corresponding week of last year. For the year to date, the total shipments have amounted to 646,050 tons—an increase upon the same period of last year of 16,738 tons.

Withdrawal of the Electric Lighting Clause from the Southampton Gas Bill.—At the meeting of the Southampton Town Council last Wednesday, the Town Clerk (Mr. G. B. Nalder) read a letter from the Solicitors to the Southampton Gas Company, announcing that the Directors had decided to withdraw from their Bill now before Parliament the clause to enable them to apply for a Provisional Order to sanction the supply of electricity.

The Filey Gas and Water Works Purchase Question.—The Directors of the Filey Gas and Water Company have decided to refuse the terms offered by the District Council for the purchase of their undertaking, as set forth in the "JOURNAL" last week (p. 299).

Water-Gas Plant at the Folkestone Gas-Works.—The Directors of the Folkestone Gas Company have decided to adopt the manufacture of carburetted water gas; and they have entrusted the design and construction of the plant to Messrs. Samuel Cutler and Sons, of Millwall.

New Joint-Stock Companies.—The Wickless Incandescent Safety-Lamp Company, Limited, has been formed with a capital of £10,000, in £1 shares, to introduce a new incandescent lamp burner, and to manufacture and deal in lamps, &c. The Septic Tank Syndicate, Limited, with a capital of £60,000, in £1 shares, will acquire the septic tank or any other system of dealing with sewage, and develop or work it.

Free Gas-Stoves for Leeds Artisans.—With the view of further extending the use of gas by the working classes, the Leeds Gas Committee purpose issuing notices of their intention to supply rent free to any dwelling in the city a small cooking-stove with a prepayment meter attached, and give 30 cubic feet of gas for 1d. As only two-thirds of this will be required to cook a dinner for an ordinary family the cost will be less than ¾d.

Gas Consumption at Blackpool.—From an official statement just published, it appears that in six years the consumption of gas in Blackpool has increased from 165 to 314 million cubic feet. The receipts have risen from £28,000 to £48,000; and the length of mains is 57 miles, as against 35 miles in 1892. The consumers now number 7250; and in the period under notice the price of gas has been reduced from 2s. 6d. to 2s. 4d. per 1000 cubic feet.

The Poll on the Todmorden Water Question.—The result of the poll at Rochdale on the proposal to purchase the Todmorden Water Company's reservoir, acquire their gathering-ground, and promote a Bill in Parliament for these objects, was announced last Friday by Mr. Miles Ashworth, the Mayor. He stated that 8692 ratepayers had voted in favour of the purchase, and 4368 against it; being a majority of 4324 in support of the scheme.

Reductions in Price.—It was reported at the last meeting of the Congleton Town Council that the price of gas was reduced from Dec. 31 to 3s. per 1000 cubic feet for domestic use, and to 2s. 8d. for manufacturing purposes. The Directors of the Warrenpoint Gas Company announce a reduction in price of 5d. per 1000 cubic feet. From March 31 next, the Clevedon Gas Company have decided to make a uniform charge for gas of 3s. 6d. per 1000 cubic feet in Clevedon and Walton, excepting by prepayment meters. It was not so very long ago that the price was 4s. 6d. The Directors of the Camborne Gas Company have announced that the price of gas is to be reduced to 5s. per 1000 cubic feet, with discounts on a graduated scale down to 4s. 3d. per 1000 cubic feet net. A reduction of 5d. per 1000 cubic feet has been made by the Rothbury Gas Company.

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37, BLACKFRIARS STREET.
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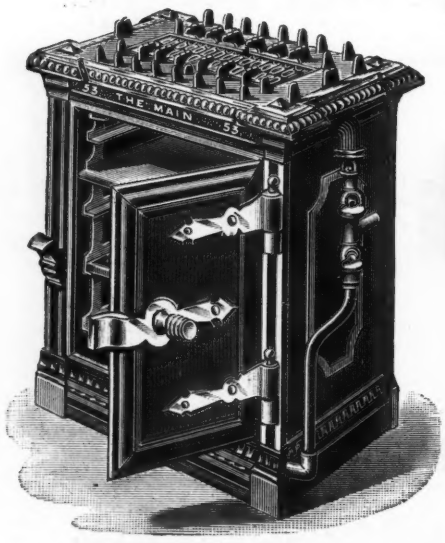

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Lamplighters' Wages at Newcastle.—The lamplighters of Newcastle have at length gained the advance in wages which they asked for at the time of their strike early last year, and which action led to much trouble in the city. They then secured an addition of 1s. to their wages; and last Wednesday the City Council, on the recommendation of the Watch Committee, conceded a further 1s.—making the 2s. which the men demanded.

Sales of Shares.—Consolidated old ordinary stock of the Staffordshire Potteries Water Company to the nominal amount of £750 was lately sold at Hanley at from £185 to £186 10s. per cent. £5000 of new ordinary Gosport water stock has been sold by auction for £9387 15s.; representing an average of £188 per cent. By order of the Directors of the Gosport Water Company, under the powers granted by the Gosport Water Order of last year, £5000 of new ordinary 7 per cent. stock was offered for sale last Wednesday, and realized £9387. Eight original £50 shares in the Bedford Gas Company, the last dividend on which was at the rate of 12 per cent. per annum, have lately been disposed of at prices ranging from £119 to £122 10s.; one £62 10s. share realizing £154 10s. Last Thursday, some original £10 shares in the Rugby Gas Company (on which a dividend of 12 per cent. has been paid) were disposed of by auction at Rugby, and realized £30 4s. per share. Five £10 shares, of which £6 10s. has been paid, were sold for £20 10s. each. The competition was very brisk.

The Southport Ironmongers' and Plumbers' Associations and the Supply of Gas-Stoves.—At the meeting of the Southport Town Council last Tuesday, the Chairman of the Gas Committee (Mr. J. Dimond) moved the confirmation of a recommendation of the Committee that the tenders of certain retail ironmongers in the town for the supply of gas-stoves should be accepted. He explained that some time ago the Southport Ironmongers' Association asked for an interview with the Gas Committee with reference to the hiring of gas-stoves—making various complaints as tradesmen of the borough. The Committee received the deputation, and after a long interview told them—after they had asked whether the Committee would be willing, in case the Association could supply gas-stoves to the Corporation at the same price as the makers themselves, to allow them to tender for the supply—that the Committee had no objection to their tendering. On the 18th ult., the Committee received the tenders, at the same price as that at which they were being supplied by the manufacturers. These ironmongers represented the Southport Ironmongers' Association; and the resolution was satisfactory to them. The arrangement was that the orders received by the Gas Committee at their show-rooms should be sent to the Hon. Secretary of the Association, and he would distribute them equally among the members who undertook the fixing of gas-stoves. The Town Clerk (Dr. J. Davies Williams) then read a memorial, signed by fifteen members of the local Master Plumbers' Association, asking that the plumbers should not be excluded from the supply of gas-stoves. Mr. Dimond said he was in sympathy with the memorial, because he had no desire to do anything derogatory to the interests of the town; and he thought the Committee should give the matter further consideration. The memorial was accordingly referred to them.

Additional Water Storage for Wirksworth.—A meeting of ratepayers of Wirksworth last Tuesday consented to a scheme which has been proposed for affording a better supply of water to the town. The project provides for the construction of a reservoir, to hold 3 million gallons of water, at an estimated cost of £3700.

Colne Valley Water Company.—At the half-yearly meeting of this Company to-day, the Directors will report a profit of £5847 made in the six months ending Dec. 31. The amount available for distribution is £4579; and a dividend at the rate of 5 per cent. per annum, less income-tax, will be recommended. This will leave about £450 to be carried forward.

Gas Deposits at Longton.—An inquiry by a Sub-Committee into the system of gas deposits has resulted in the Longton Town Council rescinding a previous resolution on the subject, and agreeing that in future deposits or guarantees should only be required in the case of licensed houses, temporary consumers, small consumers, or in such other instances as the Gas Committee may decide.

St. Petersburg Water Supply.—According to a telegram from St. Petersburg, through Reuter's Agency, published in a daily contemporary on Monday last week, the Russian newspaper "Grashdanin"—Prince Mestchersky's organ—has just been prohibited from publishing advertisements, owing to the recent insertion in its columns of an article headed: "Quousque tandem, O Catilina," in which the Municipal Council of St. Petersburg were vigorously taken to task for their neglect of the water supply of the city and the state of the conduits, which the writer declared to be in so filthy a condition as to endanger the health of the public, and even that of the Imperial Family. The Municipality at first intended to prosecute Prince Mestchersky for defamation. However, at a meeting which was held to consider the question, the conclusion was arrived at that the article should be treated with disdainful silence; and the disciplinary measure mentioned above was deemed sufficient to meet the requirements of the case.

The Whessoe Foundry Company, Limited, of Darlington, have obtained the contract for a gasholder for the Filey Gas and Water Company.

The Kirkcaldy and District Water Commission have accepted the offer of Mr. A. Fraser, of Kirkcaldy, for the construction of an extension of the water-works, at the price of £75,239.

The whole of the contract for the extensions at the St. Andrews Gas-Works—including a steel foul main, eight annular condensers, liquor-tank, one of Holmes's patent "New" scrubber-washers, exhauster and engine, &c.—has been placed with Messrs. W. C. Holmes and Co., of Huddersfield; the plans being prepared by Mr. Robert Hall, the Engineer to the St. Andrews Gas Company.

Messrs. Richmond and Co., Limited, have been awarded the first prize in the "Ironmonger" Diary (1898) Prize Competition for the best advertisement. The question was: "Whose advertisement is, in your opinion, best calculated to promote business?" and Messrs. Richmond's secured a preponderance of votes—coming out with 30 per cent. of those gained, and winning the prize easily.

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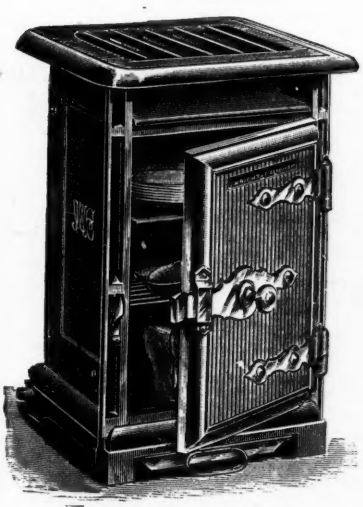

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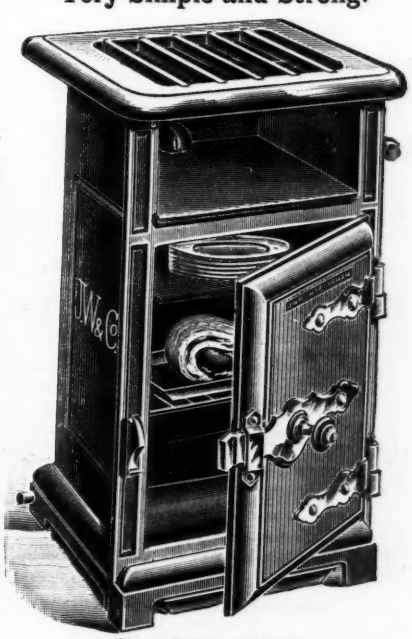

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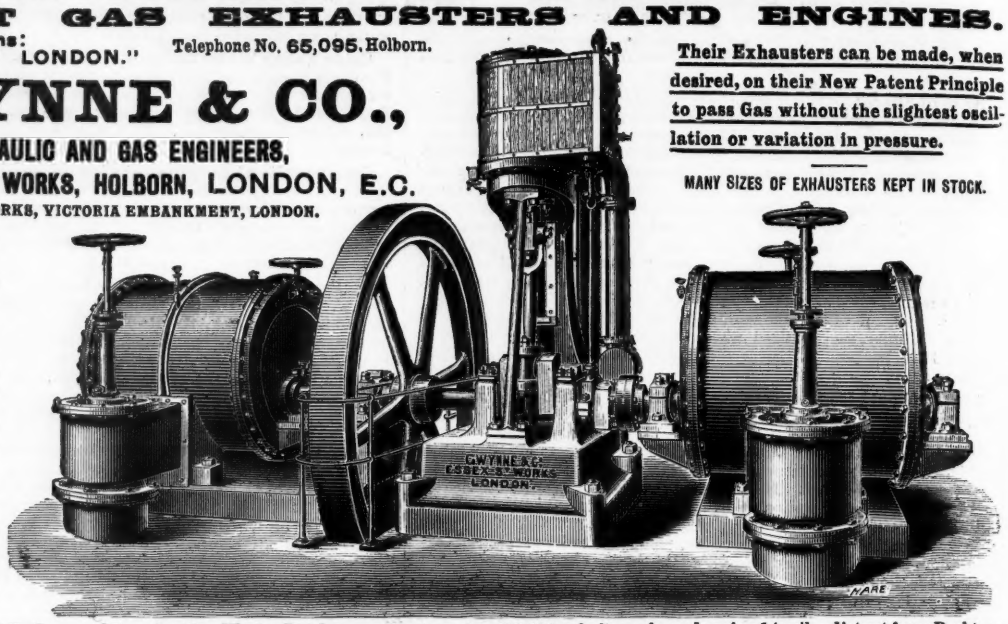

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[For Illustrated Advertisement, see Feb. 1, p. 252.]

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Address No. 3003, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION required as Chief Clerk and Cashier, 21 years with a large Provincial Gas Company. Thoroughly competent to take management of Office and charge of Books. Highest possible References.

Apply, by letter, to No. 3001, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a practical Working Gas MANAGER, who will shortly be at liberty, a SIMILAR POST on a Gas-Works of 8 millions and upwards. Understands thoroughly the Manufacture and Distribution of Gas in all its Branches. Excellent Testimonials for over Twenty Years.

Address No. 3002, care of Mr. King, 11, Bolt Court FLEET STREET, E.C.

MALVERN URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

WANTED, a smart intelligent young Man as RETORT SETTER. One accustomed to Regenerative Settings. Good Wages and regular Employment to a really good Man.

Apply, by letter, to the MANAGER.

WANTED, a Traveller by a Firm of Gas Engineers. One who understands Gas Engineering, and able to take Particulars for Extensions, will have preference.

Apply, stating Age, Experience, and Salary required, to No. 2998, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

A GAS Engineer requires the temporary services of a DRAUGHTSMAN well up in Retort Work, &c.; also a JUNIOR DRAUGHTSMAN permanently.

Apply, by letter, stating Age, Experience, and Salary required, to No. 3004, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Bexhill Water and Gas Company a RENTAL and GENERAL CLERK, accustomed to the keeping of Gas and Water Company's Books. None need apply but those who have held a similar appointment in Gas and Water Office.

Application, with *copies* of Testimonials, to be made to the MANAGER, Gas Office, BEXHILL.

WANTED, at once a steady, competent Man as MAIN LAYER. Also an ENGINE DRIVER who has been accustomed to looking after Petroleum and Gas Engines. None but Competent Men need apply.

Applications to be made to the MANAGER, Gas Office, BEXHILL.

CONTINENTAL Company want to open relations with Import Firms, or fairly introduced Agents for the SALE OF BOG ORE for Gas Purification. The Materials come from own diggings, and are considered the best in the market. Very liberal Terms offered.

Only well-introduced Firms are requested to apply to BERNARD VIELER, Nymegen, HOLLAND.

WANTED, a Working Foreman who is able to take charge of Works (make about 11 Million cubic feet per annum), used to Engine and Exhauster, and to fixing Meters and laying Mains and Services.

Apply, stating Age, Experience, and Salary required (free House, Coal, and Gas), with References, to the SECRETARY, Gas Office, North Ormesby, MIDDLESBROUGH.

WANTED, by a Firm in the Coal Trade, One or Two REPRESENTATIVES in Districts where the Firm is not already represented. Applicants must have been accustomed to calling upon, and obtaining orders from, Gas Companies. State District where Connection lies.

Apply, by letter, to No. 3000, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO LET, on Lease, the Gas-Works of the Burton Gas, Coal, and Coke Company, Limited. Possession on the 27th of March, 1898, or earlier by arrangement.

Apply to JAS. WILKINSON, Secretary, Burton, WESTMORELAND.

P.S.—The taker will have the refusal of the principal Coal Agency in the Town.

WANTED Carbon. State Price for 4-ton Lots, delivered at nearest Station.

Address No. 2960, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, 23 good Second-hand MOUTHPIECES, 21 in. by 15 in. Ovals or 21 in. by 15 in., round corner ⊏, with duplicate Lids, Cross-Bars, Screws, &c.

Address GAS-WORKS, Romsey, HANTS.

LARGE PURIFIERS WANTED.

WANTED, a second-hand set of Four PURIFIERS in good condition, with Connections complete. Superficial area of each box 500 to 580 square feet, with 18-inch Connections.

Price and full Particulars to No. 2999, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ALTON GAS COMPANY.

THE above Company have for Disposal a 5000 Cubic Feet per Hour ROUND STATION METER (by Braddock), with Valves and Connections. Also one 6-inch CENTRE-VALVE for four Purifiers (three on and one off). These articles can be had very cheap. They are in thorough repair.

For Particulars, address F. BARNLEY, Gas-Works, Alton, HANTS.

FOR SALE—Square Station Meter (1885), by Bent, in good condition. Capacity of Drum, 100 cubic feet; register, 10,000 cubic feet per hour; Hydraulic Bye-Pass.

For Price, &c., apply to H. BARKER, Manager, Gas-Works, PONTYPRIDD.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.

Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 5000 to 6000 lbs. of Sulphate per day.

For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

FOR SALE, Cheap—The undermentioned GAS PLANT:—

	Square. Ft. in.	Deep. Ft. in.		
2 PURIFIERS,	8 0	4 6	6-in.	Valves & Connections.
1 "	7 6	4 6	6 "	" "
2 "	5 0	4 0	4 "	" "
1 "	5 0	2 9	4 "	" "

C-I. SCRUBBER, 38ft. 6in. high, 6ft. dia., 14-in. "
CONDENSER, 4 inches diameter, Vertical Pipes.
EXHAUSTER (Gwynne's) 20,000 c.f. per hour 8-in. Valves

Apply to SAML. WHILE AND SONS, 60, QUEEN VICTORIA STREET, E.C.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

GASHOLDER FOR SALE.

THE Corporation of Glasgow are pre- pared to receive OFFERS for the IRONWORK of a Gasholder and Framing, 111½ feet in diameter by 52 feet, to be taken down at, and removed from, their Tradeston Gas-Works.

Forms of Tender and Orders to Examine the Gasholder, may be obtained at the Engineer's Office, No. 45, John Street.

Sealed Offers, marked "Tender for Gasholder," to be addressed to the Subscriber, and lodged with him on or before Tuesday, the 22nd curt.

J. D. MARWICK,
Town Clerk.

City Chambers, Glasgow,
Feb. 11, 1898.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR STATION METERS.

THE Corporation of Glasgow invite TENDERS for Two STATION METERS to be erected at their Dawsholm Gas-Works.

Plans may be seen, and Form of Tender obtained, at the Engineer's Office, 45, John Street, Glasgow.

Sealed offers, marked "Tender for Station Meters," to be addressed to the Subscriber, and lodged with him on or before Tuesday, the 22nd inst.

The Corporation do not bind themselves to accept the lowest or any Tender.

J. D. MARWICK,
Town Clerk.

City Chambers, Glasgow,
Feb. 4, 1898.

BOROUGH OF BRIGHOUSE.

THE Town Council are prepared to receive TENDERS for the supply of the following Stores—viz., FIRE-CLAY GOODS, IRONMONGERY, OIL, PAINTS, &c., WROUGHT-IRON TUBES and FITTINGS, and BRUSHES, required by the Gas Committee during the Year ending March 31, 1899.

Specifications and Form of Tender can be obtained on application at the Gas Engineer's Office, Mill Lane Works, Brighouse.

Sealed Tenders are to be sent in on or before Monday, the 28th day of February, 1898, addressed to the Town Clerk, Public Offices, Brighouse.

The lowest or any tender not necessarily accepted.

By order,
JAMES PARKINSON,
Town Clerk.

Public Offices, Brighouse,
Feb. 11, 1898.

J. A. & W. THARP, Auctioneers, Sur- veyors, and Estate Agents, 9, Norton Folgate, BISHOPSGATE STREET, E., and Leytonstone, ESSEX.

PERIODICAL SALES of FREEHOLD and LEASEHOLD PROPERTIES, STOCKS, SHARES, and DEBENTURES, held at the Mart. Rents Collected and Estates Managed in all parts of London and Suburbs.

Inclusive Terms on receiving Instructions.

STOCK AND SHARE SALE, FEB. 24, AT TWO O'CLOCK.

J. A. & W. THARP will include in their SALE, as above, SHARES and DEBENTURES in the following established Dividend-Paying Companies:—

Commercial Gas Company.
Clacton-on-Sea Gas and Water Company, Limited.
West Ham Gas Company.
Patent Victoria Stone Company, Limited.
Swan and Edgar, Limited (Preference).
Maple and Co., Limited (Preference).
Pavilion Theatre, Limited.
Lea Bridge, Leyton, and Walthamstow Tramways Co.
London General Omnibus Company, Limited.
London Road-Car Company, Limited.
National Safe Deposit Company, Limited.
East London Railway (Debenture Stock).
Belle Steamers, Limited.
Apollinaris and Johannis, Limited.

AUCTION OFFICES: 9, Norton Folgate, BISHOPSGATE STREET, E.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, Willoughby Lane, Tottenham, on Saturday, the 26th day of February inst., at Half-past Three o'clock in the afternoon precisely, to receive the Report of the Directors, the Statement of the Accounts for the Half Year ended the 31st day of December, 1897, to declare Dividends, and transact such other Business as the Act of Parliament directs.

The TRANSFER BOOKS WILL BE CLOSED from the 11th till the 28th inst., both days inclusive.

By order of the Board of Directors,
JAMES RANDALL,
Secretary.

Offices of the Company:
Willoughby Lane, Tottenham,
Feb. 11, 1898.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the White Hart Hotel, Bromley, Kent, on Thursday, the 24th day of February inst., at Six o'clock p.m. precisely, to receive the Report of the Directors, the Balance-Sheet certified by the Auditors, to declare Dividends, and for General Purposes.

Notice is also Given, that at such Meeting a RESOLUTION will be submitted to RAISE, by the creation of Debenture Stock, A FURTHER SUM OF £2500 and to authorize the Directors to issue such Stock, at such times, upon such terms, in such manner, and subject to such conditions as they may think fit.

The TRANSFER BOOKS WILL BE CLOSED from the 10th to the 24th inst., both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices at the Works: Bromley,
Kent, Feb. 5, 1898.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Monday, March 7, at Two o'clock, in Lots,

£10,000 OF ORDINARY STOCK
OF THE
PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY,

Ranking for a Standard Dividend of 5 per cent., subject to the Sliding-Scale; the last Dividend on similar Stock in the Company having been at the rate of 6½ per cent.

Particulars may be obtained at the COMPANY'S OFFICES, 1, Athenæum Terrace, PLYMOUTH; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
HAYWARD'S HEATH DISTRICT GAS COMPANY.

NEW ISSUE OF 400 £10 SHARES,

Ranking for a Standard Dividend of 7 per cent.; the last Dividend on similar Shares having been at the rate of £8 1s. per cent.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Monday, March 7, at Two o'clock, in Lots.

Particulars may be obtained of the SECRETARY, at the Company's Offices, 85, GRESHAM STREET, E.C.; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
EPSOM AND EWELL GAS COMPANY.

£1500 OF FIVE PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Monday, March 7, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 TO 1888.

NOTICE is Hereby Given, that Thomas Rowan, of Decomet, St. Kilda, Melbourne, Victoria; Sydney Alexander Bailey, of No. 6, Fowkes Buildings, Great Tower Street, London; and Thomas Rowan, formerly of 174, Amherst Road, Hackney, Middlesex, but now of 5, Rosslyn Gardens, Hampstead, have APPLIED FOR LEAVE TO AMEND THE SPECIFICATION OF THE LETTERS PATENT No. 1067 of 1895, granted to Thomas Rowan, for "Improvements in Apparatus appertaining to Gas Lighting."

Particulars of the proposed Amendments were set forth in the "Illustrated Official Journal (Patents)" issued on the 2nd of February, 1898.

Any person or persons may give notice of opposition to the Amendment (on Form G), at the Patent Office, 25, Southampton Buildings, London, W.C., within One Calendar Month from the date of the said "Journal."

(Signed) C. N. DALTON,
Comptroller General.

FELL AND JAMES,
1, Queen Victoria Street, London, E.C.,
Agents for the Applicants.

By order of the Directors of the
CROYDON COMMERCIAL GAS AND COKE COMPANY.

SALE OF £2500 FIVE PER CENT. PERPETUAL DEBENTURE STOCK AND £5000 "B" ORDINARY STOCK.

MESSRS. HOOKER AND WEBB have received Instructions to SELL BY AUCTION, at the Offices of the Company, Katharine Street, Croydon, on Monday, Feb. 21, 1898, at Six o'clock precisely, in 85 Lots,

£2500 FIVE PER CENT. PERPETUAL DEBENTURE STOCK AND £5000 "B" ORDINARY STOCK

of the Croydon Commercial Gas and Coke Company. The Dividend paid on the "B" Stock for some Years has been at the rate of 11 per cent. per annum; and it is capable of further increase. The Sale therefore offers an unusually good opportunity for safe Investment.

Particulars and Conditions of Sale can be obtained of Mr. W. J. RUSSELL, the Secretary, at the Offices of the Company, Katharine Street, CROYDON; Messrs. BLYTH, DUTTON, HARTLEY, AND BLYTH, Solicitors, 112, Gresham House, LONDON, E.C.; and of the AUCTIONEERS, 4, High Street, CROYDON.

Price 6s., Cloth Bound,

THE CHEMISTRY OF ILLUMINATING GAS.

By N. H. HUMPHRYS, Assoc M.Inst.C.E., F.C.S.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

ALEXANDER CAMERON,

GAS AND CANNEL COAL MERCHANT,

48, WEST REGENT STREET,

GLASGOW.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,

165, QUEEN VICTORIA STREET, E.C.,

And at STROUD, GLOUCESTERSHIRE.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.

CHESTERFIELD.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

SANDELL'S

Gas Companies' Account Books.

The Gas Companies' Expenditure Journal.

With Printed Headings and Analyzing Guide, for keeping the Expenditure of Gas Companies upon the easiest and most correct method, and in accordance with the provisions of the Gas-Works Clauses Act of 1871. Size, 16¾ in. by 17½ in.

Price: Half-bound, cloth sides, two quires, 36s.; three quires, 45s.

This Book and its predecessor (on the same principle) have been in use since 1867.

The Gas Companies' Rental Book.

A companion Book to above with Printed Headings and Illustration, for keeping the Consumers' Accounts.

Size and Price as above.

The Analyzed Wages Book.

Compiled for use in conjunction with the above Expenditure Journal, with Printed Headings. Size, 15 in. by 10½ in.

Price: Half-bound, cloth sides, two quires, 15s.

Published by
SPOTTISWOODE & Co., 54, Gracechurch Street, E.C., and may also be had from CHARLES SANDELL, 3, Jeffrey's Square, St. Mary Axe, E.C.

Ready this Day—450 *Pages, Crown 8vo., with numerous Illustrations*, 10s. 6*d. Leather.*

THE

GAS ENGINEER'S POCKET BOOK,

Comprising Tables, Notes, and Memoranda relating to the Manufacture, Distribution, and Use of Coal Gas, and the Construction of Gas-Works.

By HENRY O'CONNOR, Assoc.M.Inst.C.E.

London: CROSBY LOCKWOOD & SON,
7, STATIONERS' HALL COURT, E.C.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.

GAS PURIFICATION BY
HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS.
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

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Telephone: Castleford No. 214. | Postal Address Castleford.
Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR COLLIERIES, LTD.

ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel.

Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

THE

"ETNA" FIRE & HEAT RESISTING

CEMENT,

For RETORT PURPOSES, is INVALUABLE.

Sole Manufacturers:

FRED VERITY & SON,

CALL LANE, LEEDS.

Scores of Testimonials received. Write for Particulars.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 84, Old Broad St., E.C.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton	10,500 Cubic Feet.
Illuminating Power	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL Co., Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895,*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

WATERBLEAN PAINT — Telegrams: "EVESON, BIRMINGHAM." — EVESON FOR CANNEL

TUBES AND FITTINGS
ALL KINDS
WRITE FOR PRICES
STAFFORDSHIRE TUBE Co., BIRMINGHAM.

HOLMSIDE
GAS COALS.
Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton	11,205 Cubic Feet.
Illuminating Power	$16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	$13\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England, and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.
Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

E. ASQUITH & CO.,
Hydraulic Engineers,
17, Mather Street, Ancoats, Manchester,
Fit up Plants for
Pressing Anthracene, Naphthalene, &c.
Competent Men sent out to erect same. Estimates given.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for
CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
Coal Owners, Newcastle-on-Tyne;
or
E. FOSTER & CO.,
21, John Street, Adelphi, London, W.C.

G. & J. HAIGH,
Raven's Lodge Fire-Brick Works, DEWSBURY.

FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

WHITE GLAZED AND SALT GLAZED BRICKS, BUFF FACING BRICKS, &c.

For Prices and Analysis, apply as above.

MOBBERLEY & PERRY
STOURBRIDGE.
Manufacture & supply best quality of
Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES; BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.
London Agents: Contractors for the erection of Retort-Benches complete.
BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

D. HULETT & CO., LTD.,

55 & 56, HIGH HOLBORN, LONDON.

"HANDY" SERVICE CLEANSERS.

Light and Powerful. Price **50s.** each.

DRY GAS-METER MAKERS.

WROUGHT-IRON TUBES AND FITTINGS.

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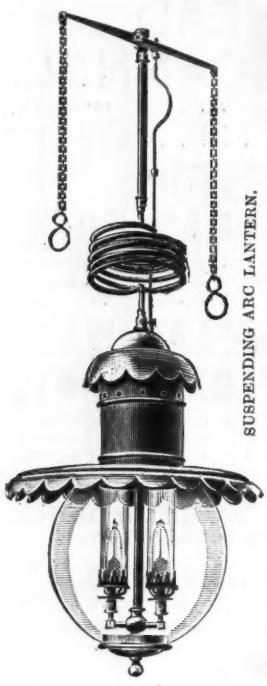

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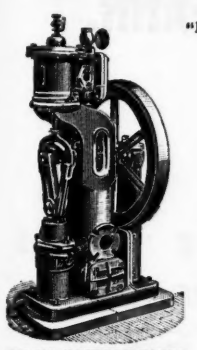

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

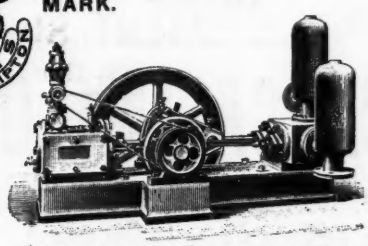

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

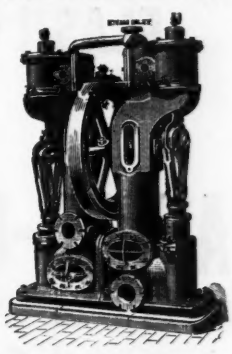

Fig. 713 "DOUBLE-RAM" STEAM-PUMP.

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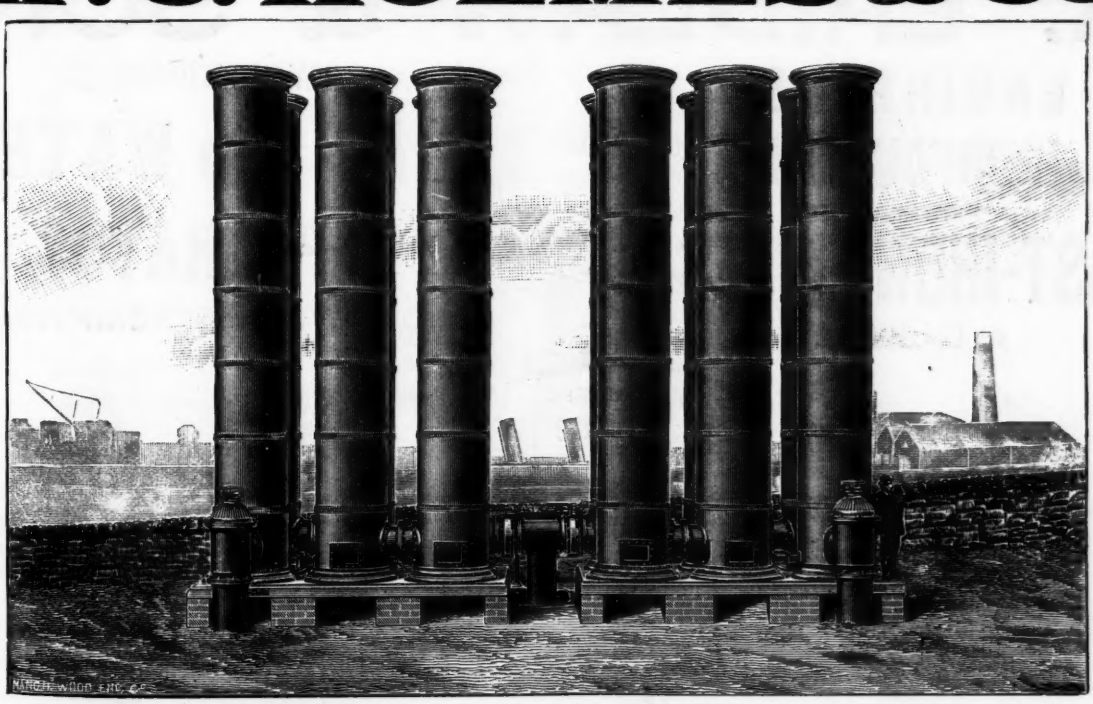

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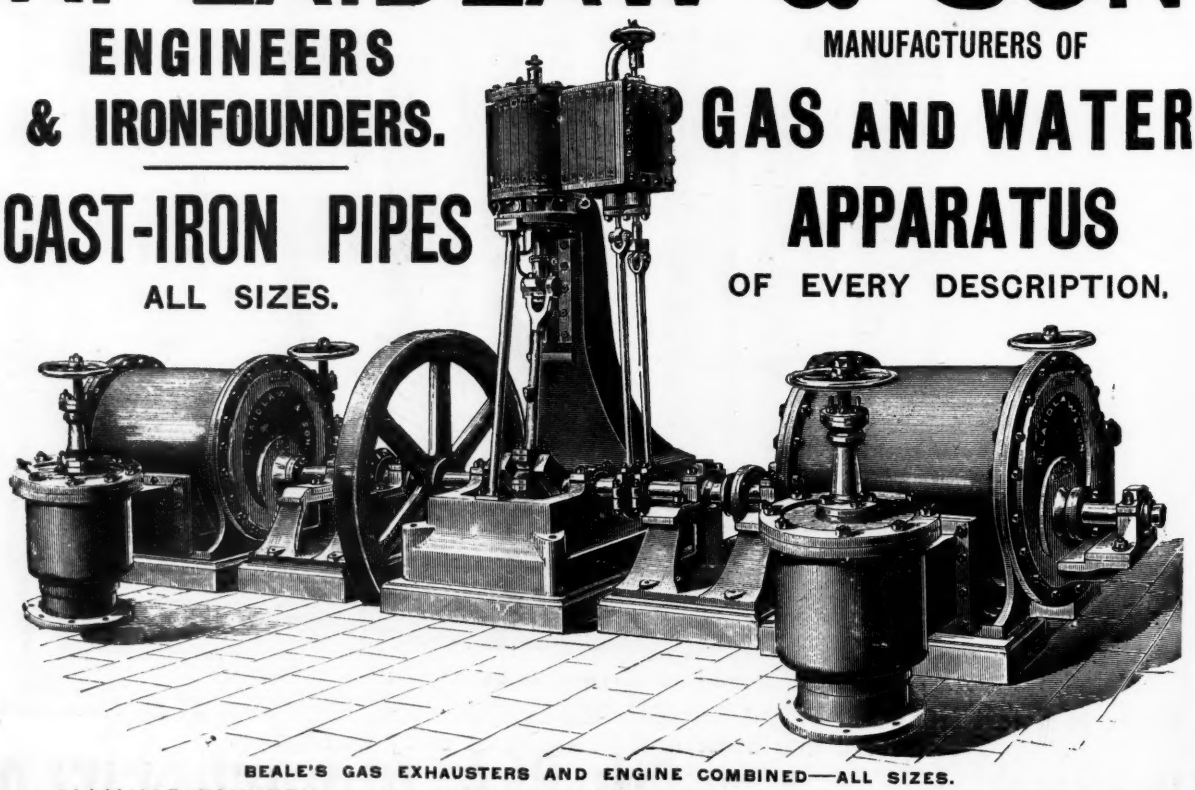

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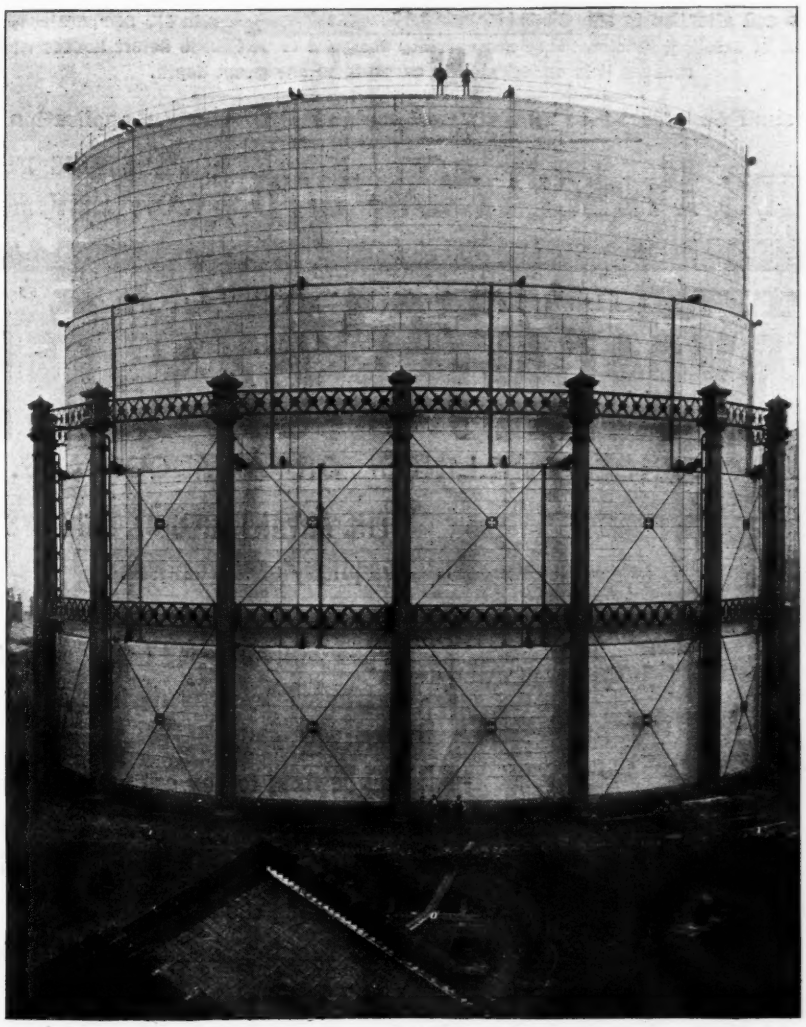

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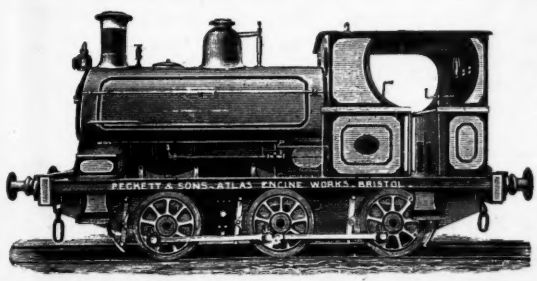

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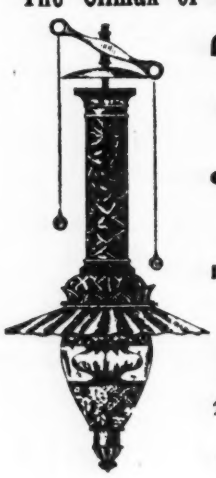

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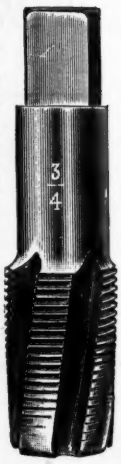

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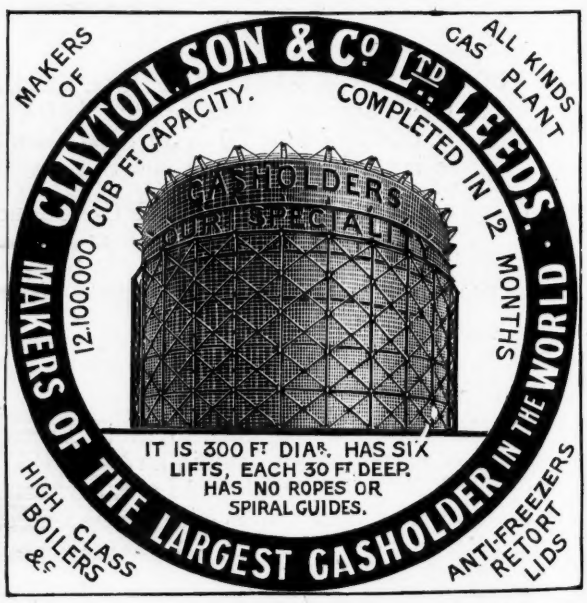
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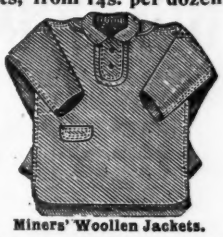
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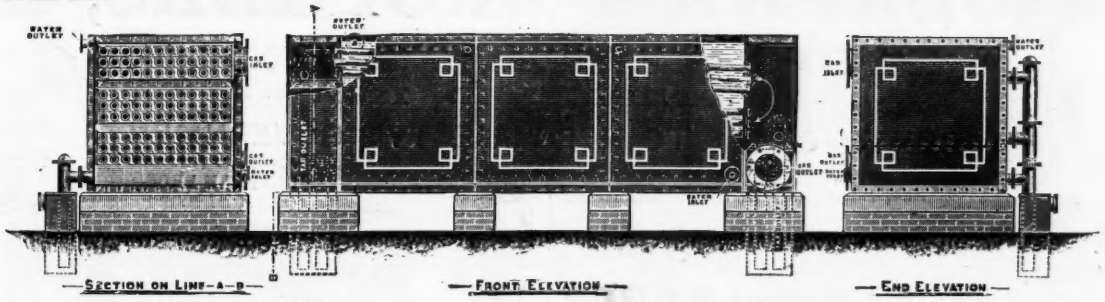

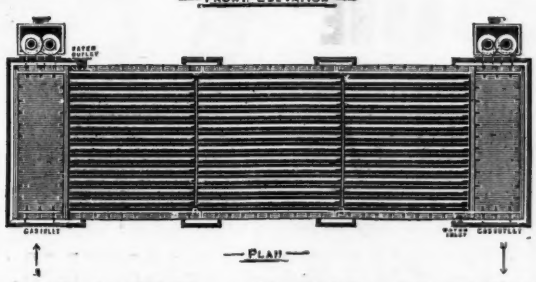
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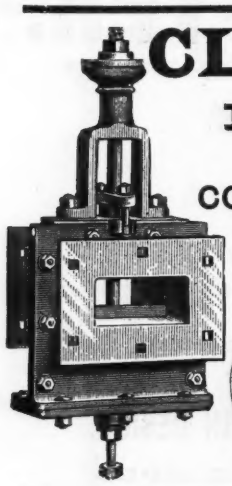

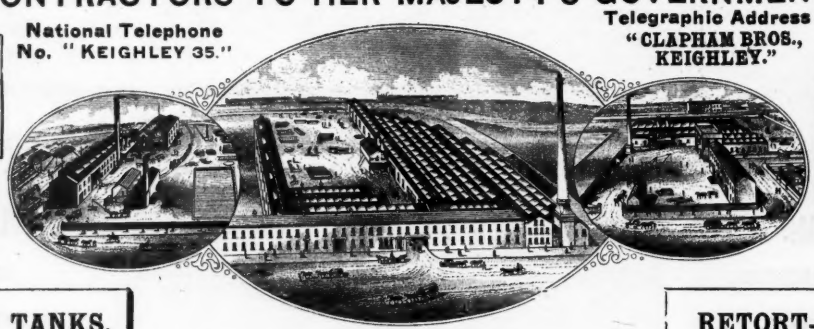

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